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# INSTITUTIONAL AND LEGAL CONSTRAINTS TO COOPERATIVE ENERGY RESEARCH AND DEVELOPMENT

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This volume consists of three related elements:

I. A Commerce Technical Advisory Board report which provides guidelines for the design and operation of R&D consortia with a minimum risk of antitrust challenge.

II. The proceedings of a symposium cosponsored by the Department of Commerce and the Industrial Research Institute on December 16, 1974. The symposium provided a platform for a government-industry dialog on the need for and the barriers to cooperative research and development.

III. The results of a survey of Industrial Research Institute member companies which identifies industry's perceptions of the barriers to cooperative R&D ventures and describes eight illustrative case histories.

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# INSTITUTIONAL AND LEGAL CONSTRAINTS

# TO

# COOPERATIVE ENERGY RESEARCH AND DEVELOPMENT

U.S. DEPARTMENT OF COMMERCE
COMMERCE TECHNICAL ADVISORY BOARD
AND
THE INDUSTRIAL RESEARCH INSTITUTE

# FOREWORD

This volume contains three components of a study of the institutional and legal constraints to cooperative energy research and development:

Part I. Industry Collaboration in Energy R&D, Perspectives on the Regulatory Setting: A Report of the Commerce Technical Advisory Board (CTAB) to the Secretary of Commerce.

Part II. The Proceedings of the Seminar on Institutional and Legal Constraints to Cooperative Energy R&D which was co-sponsored by the Department of Commerce and the Industrial Research Institute on December 16, 1974.

Part III. Study of Legal and Institutional Barriers to Industry Participation in Cooperative Research and Development which was performed by the Industrial Research Institute (IRI) under contract to the Department of Commerce.

Because of the high risk and large investments involved in the development of a number of new energy technologies, the 1974 Commerce Technical Advisory Board recommended that industry-government and multi-company cooperative research and development programs should be seriously considered. With this in mind, the Board began a study of industry's perception of the barriers to such cooperative ventures. The CTAB study resulted in a paper on the antitrust aspects of the problem (Part I) and a recommendation that the Commerce Department support the broader IRI study (Part III).

At the same time, the Interagency Committee on International Cooperation on Energy R&D recognized that industry's participation in international joint ventures would depend very strongly on industry's perceptions of the barriers involved. The IRI study was supported by funds provided by the Interagency Committee. Two cases illustrative of

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international ventures are mentioned in Part III. The study makes it clear that the major barriers to cooperative energy research and development are perceived by industry as barriers to both domestic and international ventures.

The CTAB and IRI studies culminated in the December 16, 1974 Seminar (Part II). The CTAB report was distributed to all prospective attendees. Industry spokesmen at the seminar expanded on cases from the IRI study.

Donald Collier, a member of CTAB and former President of IRI, has served as liaison between the Department of Commerce and the Industrial Research Institute throughout this study.

It is hoped that this work will be the beginning of a continuing industry-government effort to explore this potentially important solution to some of our Nation's energy resource problems. I particularly wish to remind readers from the industrial sector of General Counsel Bakke's offer of Commerce Department assistance in undertaking an appropriately structured consortium that can reasonably be expected to meet the criteria for a favorable determination by the Department of Justice under its Business Review Procedures.

Betsy Ancker-Johnson
Assistant Secretary of
Commerce for Science
and Technology

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# INDUSTRY COLLABORATION IN ENERGY R&D

## Perspectives on the Regulatory Setting

A
Report of the
Commerce Technical Advisory Board
to the
Secretary of Commerce

December 16, 1974

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**UNITED STATES DEPARTMENT OF COMMERCE**
**The Assistant Secretary for Science and Technology**
Washington, D.C. 20230

December 16, 1974

Honorable Frederick B. Dent
Secretary of Commerce
Washington, D.C. 20230

Dear Mr. Secretary:

Since their appointment in January 1974, the current members of the Commerce Technical Advisory Board have stressed the need for a thorough examination of the optimum deployment of our national resources to meet our long-term energy requirements. Because of the high risk and large investments involved, the Board feels that a number of industry-Government and multi-company cooperative research and development programs should be considered. The Board has initiated a study to assess industry's perceptions of the constraints to cooperative research and development and has concluded that there is a dearth of pertinent cases to guide interested companies.

"Industry Collaboration in Energy R&D - Perspectives on the Regulatory Setting" is the first CTAB report in this important area. It is intended to provide information concerning current antitrust enforcement policy. This paper has been drafted with the cooperation and suggestions of the staff of the Department of Justice. It was prepared on behalf of the Board by William Carey with the staff support of Frank Cacciapaglia of my Office. The paper has received the endorsement of the entire Board.

Sincerely,

Betsy Ancker-Johnson

Betsy Ancker-Johnson

## INTRODUCTION

The Commerce Technical Advisory Board has examined the potential for joint or cooperative industrial research and development in relation to regulatory constraints of antitrust enforcement. CTAB's purpose has been to determine whether R&D consortia in the industrial sector are feasible within the antitrust enforcement ground rules. CTAB's action is predicated, in part, on the desire to furnish information to allay doubt among businessmen concerning current antitrust enforcement policy in order to permit early and decisive action in joint R&D.

The conclusion is that, with forethought and proper safeguards, R&D consortia can be designed and operated at low risk of antitrust challenge. This paper undertakes to spell out and clarify the types of acceptable arrangements.

The Department of Justice, obviously, cannot be committed to a policy of absolute immunity for R&D consortia. The Department reserves the right to determine each case on its merits and on the facts. However, the Department's Antitrust Division has been consulted in the preparation of this paper and has made many helpful contributions. CTAB believes that significant opportunities exist for cooperative R&D which will be needed in helping to solve present and emerging energy shortages. After consultation with Justice, CTAB seeks to indicate how companies can undertake cooperative R&D in the face of constraints raised by Federal Antitrust enforcement policy and to offer corporate decision makers basic guidance as to which joint activities are probably permissible and which are probably violative of the antitrust laws. One particularly important item in this respect, the Department of Justices' Business Review Procedure, is developed later in this paper.

Public policies often are at odds with each other. Antitrust policy has a long history and is firmly grounded in statutory law and jurisprudence. As urgent public needs arise, as in the case of energy needs, the objectives of public policy must be balanced against other well-established objectives, and solutions derived which make it possible to achieve national goals within the prevailing legal structure. That is what is attempted here. An R&D consortium need not breach antitrust policy, and there is no prima facie reason why a consortium is a threat to competition. The question turns on the form, structure, and characteristics of the consortium. This paper addresses these considerations.

## THE NATIONAL ENERGY RESOURCES PRIORITY

The President and the Congress have committed the United States to a long-term effort aimed at improving and diversifying the Nation's energy resources. A significant part of this effort is in the R&D area. Large investments, private as well as governmental, are contemplated covering a number of energy options--fossil fuels, nuclear fuels, geothermal, solar, and other potential sources of energy. This national effort is perceived as one requiring concerted participation by all sectors of the society: government, business, and consumers. While government expenditures for R&D will be very large, the probability is that private spending will be even greater.

The incentive for technological innovation must exist if the problems are to be solved. Barriers to innovation are known to exist, and these barriers are both technical and institutional. In addition, law and legislation have created regulatory and enforcement systems for the purpose of protecting competitive private enterprise and preserving opportunity for innovation. Although the development of national self-sufficiency in energy resources is now defined as a paramount "national interest," this alone does not cancel out the prevailing legal and policy inhibitions against unreasonable restraint of trade. National energy policy must be administered on a basis consistent and compatible with these constraints. It is a large order, but not an impossible one.

In searching for a legal and organizational strategy which enables industry to create consortia for cooperative R&D in the energy crisis, CTAB is not proposing to insulate such ventures from fair operation of the antitrust laws, nor to claim for them the right of free play under a blanket immunity against antitrust enforcement. CTAB's objective is to identify routes which reasonable business executives, acting in good faith and upon the government's urging, can take in responding to the need for R&D while minimizing the risk of unintended adverse legal consequences.

## THE USES OF JOINT R&D

In mounting a massive national energy R&D effort, the private sector faces three large problems: time, cost, and technological innovation. Both independent and cooperative R&D will have a place in such an effort. The choices are essentially up to industry. Where the R&D undertakings are substantial, involve long lead times, and entail significant risk and uncertainty, the advantages of economies of scale and concerted effort will be considerable. Fragmentation and isolation of R&D may prolong the R&D cycle and retard innovation, as well as escalate costs. Similarly, diffused R&D may discourage risk-taking because of unacceptable investment burdens on particular firms.

Joint R&D, on the other hand, may go far towards overcoming these problems. It may be appropriate for different stages of innovation, compared with the full cycle. The crucial question, however, is whether joint R&D could result in too much concentration of business power to a point where government would intervene with corrections. This is a problem which may be met, to some degree, by stipulations which limit the duration of the joint research or by specifying particular targets of R&D. However, the Justice Department has never taken the view that size is, in itself, objectionable; the issue is not the joint character of the arrangements, but rather their effects upon competition.

A corporate or multi-corporate decision to engage in joint research through a consortium structure will certainly be reached, in part, upon assessment of the antitrust risk. What must be understood, in making the choice, is that the option should not be ruled out without considering the available criteria for a viable multi-company R&D venture. Antitrust enforcement policy is not inflexible. It does not ignore the Nation's needs and problems. It has an affirmative as well as a prosecutive side.

## STRIKING A WORKABLE BALANCE

Industry collaboration in R&D, alone, does not constitute a definition of monopoly. Some forms of collaboration may break the rules but others may be within the rules. In the annals of antitrust enforcement, no instance of joint research, cooperative research, or information exchange has been held to constitute a *per se* violation, absent further proof that it has had a *significant* anti-competitive effect. If protections are designed into the cooperative structure, the risks of future trouble can be avoided.

To make an antitrust challenge stick, two tests arise. The first is to prove there has been concerted action among the parties. This alone, however, is not enough to constitute a violation. The second test is the critical one: a showing that the concerted action results in an unreasonable restraint of trade.

CTAB, after consultation with the Antitrust Division, suggests to industry a variety of designs for collaborative R&D in energy which appear to be highly acceptable:

### Multiple consortia

A single group, association, or consortium of firms interested in joint R&D may or may not raise concerns as to exclusion of other firms. However, if two or more consortia operate independently of one another in a competitive R&D effort, the likelihood of the joint venture having an anticompetitive effect is lessened significantly. Additionally, the public interest is served by stimulating innovation through the incentive of competition.

### Competition within a single consortium

A variant would be to create one association of firms for R&D but to design competing R&D teams into the structure to carry on autonomous R&D effort.

### Focus on Basic Research

Since the risk of restraint of competition is larger where firms share applied research than is the case with basic research, a consortium to share only basic research would be likely to raise few questions. However, if both applied and basic research are being shared, the presence of the basic research would not suffice to materially improve the acceptability of the agreements, though it might carry some weight.

### Balancing the mix of participation

Further safeguards against the appearance of monopoly would include the involvement of small or medium sized firms which, acting alone, could not achieve the scale or potential for successful innovation in the energy field. The inclusion of such firms would strengthen competition by lending them the benefits of large-firm scale, resources, and risk taking.

### General Availability of Proprietary Rights

One of the payoffs for successful joint R&D will be patents and trade secrets involving advancements in industrial know-how and state-of-the-art. To the extent that these proprietary rights are made available, on a reasonable basis, not only to consortium members but also to all qualified competitors, chances of antitrust violations can be lessened.

### Public interest representation

Since the objective of cooperative or joint R&D is to advance innovation, care should be taken to prevent the fact or appearance of collusion to retard the pursuit of potential R&D breakthroughs. It will be advantageous to include representatives of the public sector as observers and participants in consortium decision making.

## FEDERAL ADVISORY ASSISTANCE

### Department of Justice Business Review Procedure

Although the Department of Justice is not authorized to give advisory opinions to private parties, for several decades the Antitrust Division has been willing to review proposed business conduct and state its enforcement intentions under certain circumstances. The Antitrust Division of the Department of Justice has in the past extended the scope of these reviews to include assessment of proposed consortia for cooperative energy R&D. The general principle in considering the antitrust implications of any proposed business conduct is applicable to cooperative R&D activities. Cooperative arrangements for energy R&D become objectionable from an antitrust standpoint when they exert an anticompetitive effect, i.e., result in an unreasonable restraint of trade.

Contemplated arrangements upon which review will be sought should be structured with an awareness of the factors which are generally considered in determining potential impact on competition. These would include such questions as the purpose for the consortium, scope of the opportunity for participation by "outsiders," the nature of the research, whether basic, applied or both, the nature of the risk, the size of the consortium and its size in comparison to the industry at large, and the availability of proprietary information and technology developed by the consortium to all qualified competitors. Some key points of the Business Review Procedure follow.

(The complete Department of Justice statement dated December 19, 1973 is included in the appendix.)

1. The request for review is made, in writing, to the Antitrust Division of the Department of Justice.

2. Requesting parties are under an affirmative obligation to make a full and true disclosure of their proposed activity.

3. Requesting parties may rely only upon a written business review letter signed by the Attorney General, his Deputy, or the Assistant Attorney General in charge of the Antitrust Division.

4. The letter states only the enforcement intention of the Department of Justice as of the date of the letter. However, Justice has never exercised its right to bring a criminal action where there has been full and true disclosure at the time of presenting the requests.

5. The request, and the Department's response, will be available to the public on request, subject to a showing of good cause for non-disclosure.

CTAB urges companies with an interest in forming R&D consortia to take advantage of the Business Review Procedure in order to obtain a current opinion of the compatibility of their proposed approaches with antitrust considerations.

### Department of Commerce

The Bureau of Domestic Commerce of the U.S. Department of Commerce is prepared to assist in the design of proposals for energy R&D consortia and to assist industry in obtaining a Department of Justice business review.

## CONCLUSION

CTAB urges American industry to fully consider the potential advantages of R&D associations as a strategy for accelerating energy R&D. It is a mistake to reach a premature corporate judgment that a consortium for R&D will lead to antitrust trouble. The probability is in fact very high that the right uses of cooperative R&D will strengthen rather than retard competition and innovation in dealing with energy problems.

## APPENDIX

## BUSINESS REVIEW PROCEDURE
## ANTITRUST DIVISION
## DEPARTMENT OF JUSTICE
## 28 CFR 50.6

Although the Department of Justice is not authorized to give advisory opinions to private parties, for several decades the Antitrust Division has been willing in certain circumstances to review proposed business conduct and state its enforcement intentions. This originated with a "railroad release" procedure under which the Division would forego the initiation of criminal antitrust proceedings. The procedure was subsequently expanded to encompass a "merger clearance" procedure under which the Division would state its present enforcement intention with respect to a merger or acquisition; and the Department issued a written statement entitled "Business Review Procedure." This is a revision of that statement:

1. A request for a business review letter must be submitted in writing to the Assistant Attorney General, Antitrust Division, Department of Justice, Washington, D.C. 20530.

2. The Division will consider only requests with respect to proposed business conduct, which may involve either domestic or foreign commerce.

3. A business review letter shall have no application to any party which does not join in the request therefor.

4. The requesting parties are under an affirmative obligation to make full and true disclosure with respect to the business conduct for which review is requested. Each request must be accompanied by all relevant data including background information, complete copies of all operative documents and detailed statements of all collateral oral understandings, if any. All parties requesting the review letter must provide the Division with whatever additional information or documents the Division may thereafter request in order to review the matter. Such additional information, if furnished orally, shall be promptly confirmed in writing. In connection with any request for review the Division will also conduct whatever independent investigation it believes is appropriate.

5. No oral clearance, release or other statement purporting to bind the enforcement discretion of the Division may be given. The requesting party may rely upon only a written business review letter signed by the Attorney General, Deputy Attorney General, or Assistant Attorney General in charge of the Antitrust Division.

6. If the business conduct for which review is requested is subject to approval by a regulatory agency, a review request may be considered before agency approval has been obtained (except in the case of bank mergers or acquisitions) where it appears that exceptional and unnecessary burdens might otherwise be imposed on the party or parties requesting review, or where the agency specifically requests that a party or parties request review. However, any business review letter issued in these as in any other circumstances will state only the Department's present enforcement intentions under the antitrust laws. It shall in no way be taken to indicate the Department's views on the legal or factual issues that may be raised before the regulatory agency, or in an appeal from the regulatory agency's decision. In particular, the issuance of such a letter is not to be represented to mean that the Division believes that there are no anticompetitive consequences warranting agency consideration.

7. After review of a request submitted hereunder the Division may: state its present enforcement intention with respect to the proposed business conduct; decline to pass on the request; or take such other position or action as it considers appropriate. Ordinarily, however, the Division will state a present intention not to bring a civil action only with respect to mergers, acquisitions or similar arrangements.

8. A business review letter states only the enforcement intention of the Division as of the date of the letter, and the Division remains completely free to bring whatever action or proceeding it subsequently comes to believe is required by the public interest. As to a stated present intention not to bring an action, however, the Division has never exercised its right to bring a criminal action where there has been full and true disclosure at the time of presenting the request.

9. (a) Thirty days after the date upon which the Division takes any action as described in paragraph 7, the business review request, the information supplied to support it, and the Division's letter in response will be indexed and placed in a file available to the public upon request.

(b) Prior to the time the information described in subparagraph (a) is indexed and made publicly available in accordance with the terms of that subparagraph, the requesting party may ask the Division to delay making public some or all of such information. However, the requesting party must: (1) specify precisely the documents or parts thereof that he asks not be made public; (2) state the minimum period of time during which non-disclosure is considered necessary; and (3) justify the request for non-disclosure, both as to content and time, by showing good cause therefor, including a showing that disclosure would have a detrimental effect upon the requesting party's operations or relationships with actual or potential customers, employees, suppliers, (including suppliers of credit), stockholders, or competitors. The Department of Justice, in its discretion, will make the final determination as to whether good cause for non-disclosure has been shown.

(c) Nothing contained in subparagraphs (a) and (b) shall limit the Division's right, in its discretion, to issue a press release describing generally the identity of the requesting party or parties and the nature of action taken by the Division upon the request.

(d) This paragraph reflects a policy determination by the Justice Department and is subject to any limitations on public disclosure arising from statutory restrictions, Executive Order, or the national interest.

10. Any requesting party may withdraw a request for review at any time. The Division remains free, however, to submit such comments to such requesting party as it deems appropriate. Failure to take action after receipt of documents or information whether submitted pursuant to this procedure or otherwise, does not in any way limit or estop the Division from taking such action at such time thereafter as it deems appropriate. The Division reserves the right to retain documents submitted to it under this procedure or otherwise and to use them for all purposes of antitrust enforcement.

[Antitrust Div. Dir. No. 14-73, 38 F.R. 34804, Dec. 19, 1973]

# SEMINAR

# ON

# INSTITUTIONAL AND LEGAL CONSTRAINTS

# TO

# COOPERATIVE ENERGY R&D

DECEMBER 16, 1974

MAIN INTERNATIONAL CONFERENCE ROOM

DEPARTMENT OF STATE

Co-sponsored By:
The U.S. Department of Commerce
and the
Industrial Research Institute

## LIST OF ATTENDEES

## SEMINAR ON INSTITUTIONAL AND LEGAL CONSTRAINTS TO COOPERATIVE ENERGY R&D

December 16, 1974

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## OPENING REMARKS

BETSY ANCKER-JOHNSON
Assistant Secretary for Science and Technology
U.S. Department of Commerce

Good morning and welcome to the Seminar on Institutional and Legal Constraints to Cooperative Energy Research and Development.

This meeting will surely make an important contribution to the solution of our energy resources problem.

As I see it, our deliberations here will affect the scope and pace of industrial participation in the research and development necessary to achieve our national goal of energy self-sufficiency.

Our keynote speaker will, among other things, state what we can hope to accomplish by being here today.

Our keynote speaker was to have been Secretary of Commerce Fred Dent, as you all know from your programs.

Perhaps because he heads one of the most diversified Departments in the Federal Government his schedule is also one of the fullest. So I really was not very surprised when he called me yesterday, Sunday, from his office, to say that he had to take another engagement for this morning.

But the Department of Commerce boasts an extremely versatile Under Secretary, John Tabor, who is very accustomed to stepping up to the batter's plate at a moment's notice and belting out a homer.

We are very fortunate and delighted that you are going to do that for us today, John.

As I was saying, the Department of Commerce is a very diversified Department.

I am personally happy to say our Department has science and technology aspects in more than 65 percent of its activities.

Thus, Under Secretary Tabor's concerns range from the technology to secure computer data banks to the state of domestic business to the protection of endangered marine mammals to East-West trade, et cetera, et cetera, et cetera.

Among Mr. Tabor's most urgent responsibilities is promotion of energy conservation by industry which consumes 70 percent of the country's energy.

At his urgings and the Secretary's, industries across the country have been adopting a comprehensive energy conservation program developed by the Department of Commerce.

Mr. Tabor has accelerated the Department's campaign to increase public awareness of our energy dilemma, an awareness that is certainly needed to remove one of the barriers to progress towards our national energy goals.

He has taken a leading role in preparing for Presidential decision an option paper on bringing closer together the worlds of academia and commerce, a charge given by President Ford in his Ohio State University address.

It gives me great pleasure to introduce the Honorable John K. Tabor.

## KEYNOTE SPEAKER

HONORABLE JOHN K. TABOR
Under Secretary
U.S. Department of Commerce

First of all, ladies and gentlemen, I do want to express Secretary Dent's personal greetings to you. Given the special responsibilities that link the Department of Commerce with the economy and the very difficult situation in Detroit, I know you will understand that when the White House asked him yesterday to go to Detroit to a meeting of the Economic Club he, of course, saluted and said, "Aye, sir."

He just wanted to say through me and through Betsy that he regrets not having a chance to meet with you.

He asked me first of all to underscore what goes without saying but is nevertheless well worth saying: the technological and research capabilities of the private sector of this country are perhaps the greatest anywhere in the world, and these capabilities are now called upon to solve very tough but far from insoluble problems for our country.

It seems to me, ladies and gentlemen, that the United States is facing one of the most difficult but not at all insoluble problems or challenges that it has ever had, a threefold challenge which is technological, institutional and a matter of political will.

That challenge we can, I think, subsume under the term "The Energy Challenge," or "The Energy Problem."

It is very much in your laps, and that is why we are delighted to confer with you here today and so pleased that there will be in this meeting jointly sponsored by Dr. Ancker-Johnson on behalf of the Department of Commerce and the Industrial Research Institute this opportunity for candid interchange. I hope you will make the most of the opportunity for candid inquiry and rebuttal and debate here today.

I said that our needs for energy pose a huge challenge, and I would like to speak primarily about the technological side of this challenge.

In World War II, we had a huge technological challenge to generate the necessary materials for victory and to devise and invent and bring our capabilities to bear to achieve that result. But that challenge was slightly different from the present one, not in scope or importance, but in its visibility. There was no possible option that was available except to do and to produce and to perform. At the moment, I don't think there is quite that perception in this country, in your companies, in our Government, and across the land.

The energy problem is still vague and imprecise, confused and unfocused, and this makes the mobilization of your resources and our resources more difficult than it was in World War II when Pearl Harbor came and there was only one thing to do -- to mobilize and do the job.

We also had a great technological challenge when President Kennedy said in 1960 we will go to the moon. I think he suggested by the end of that decade. Here was an adventure, a race. It was a challenge. It was also limited in scope. We basically had most of the learning done. It was a matter of dollars being thrown at a problem to overcome it. And, we achieved our objective. But this effort again had a precise and narrow focus, the confines of which were pretty clear to that portion of the community that had to be involved.

But, as I look at the energy challenge, both the limits of the problem and solutions to it are less obvious. We have certain technology which is known at bench scale, but commercial feasibility has not yet been achieved. There are other areas where we have not developed the necessary technology. When we get into some of the more esoteric and progressive possibilities for increasing energy supply, we will need vast amounts of capital and this need will generate questions of how to mobilize such capital and investment choices within your companies as to where you will put your resources, whether it be to solve this problem or other problems that are on your agenda.

Nevertheless, it seems to me that we have a challenge as a Nation to end our dependence on imported oil for energy and to end profligate use of energy domestically. Let me just refresh our mutual recollections as to the severity of the problem and the nature of that problem.

In 1973, 35 percent of our oil was imported. While our energy consumption has grown at three to four percent per year over the last decades, coal production, our most abundant domestic resource, has remained for 34 years at about the 1940 level. There have not been any great significant discoveries of domestic crude in the lower 48 states onshore since 1965, and domestic crude oil production has been declining since 1970.

It is my personal view -- and there is some debate on this, obviously -- that it will take everything that we have discovered and are developing in the lower 48 and in Alaska just to stay even with our present level of domestic crude oil production.

As for natural gas, another great source of our energy, consumption exceeds our discoveries and has done so since 1968 under the regulated price at the wellhead.

So you come down to the fact that with this 35 percent of petroleum being imported, we, from the energy point of view, are import-dependent. And, the embargo of 14 months ago proved our vulnerability in terms of both domestic and foreign policy to those upon whom we depend for that imported oil. Oil is clearly a pervading element of our entire industrial machinery and economic operation.

The embargo ended. That was fine. But the price was no longer $3. It went up to $11. And, the result of that price increase will be that this year the United States of America will send overseas $18 billion more than we did in 1973 for slightly less than the amount of oil we received in 1973.

Now, that $18 billion is not a one-year affair. We will send at least another $18 billion next year and another $18 billion the following year. Such a result constitutes in effect a constant bleeding of the economic body of the United States unless we take measures to change our posture. Such a drain does not augur well for a healthy American economy.

This drain has the same effect as if some foreign country or countries levied a tax or reparations bill on America and skimmed off the top of the American economy $18 billion of discretionary spending -- for consumers or for companies which might invest in plant, machinery, equipment or other job-generating facilities. The $18 billion is no longer ours to allocate. It is not only, therefore, a bleeding of our system, but a loss of our economic options, which confronts us.

This is the nature of the underlying problem which gathers us together this morning.

Lincoln, in his, I think, second annual message to Congress, said some words well that I think are appropriate for us here at this very moment:

"The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty and we must rise to the occasion. As our case is now, so we must think anew and act anew. We must disenthrall ourselves and then we shall save our country."

The newness is easily defined, though more difficult to apply. We need a new strong effort to conserve energy at home and a new strong effort to produce energy at home. And it seems to me that this is for you, your companies, and this Government to devise. For Government's part, we will do all we can to aid and promote such efforts, but it is basically the private sector in America and the individual citizen that gets the job done.

Certainly, we must rapidly develop the new technologies necessary to unlock and deliver our large potential domestic energy resources at an acceptable economic and environmental cost. But, first let me speak of conservation. I personally believe that a great deal more emphasis must be placed on the technology pertinent to the demand side of the equation and I urge you to keep this point in mind in your deliberations about our energy R&D needs.

There is a great need for the development of more energy efficient production technology, particularly for the more energy-intensive industries. Chairman Ray of the AEC handed the President just a year ago a report recommending that there be a very intense focus on energy conserving technologies. Magnetohydrodynamic power generation, advanced auto propulsion systems, energy-efficient aircraft and ship design, new technologies for the transport and storage of energy, were but a few of those mentioned in her report to the President which was based on conferences with many of you.

This is an area that I hope you will focus upon.

But let me move in this overview to the supply side where new technology is needed also. Here I think a massive effort to deploy our national innovative resources in the optimum manner is the only way we can meet the challenge. You are all more aware than I of the broad technological front that needs serious development, but if we just look at Dr. Ray's report of a year ago, we see a fascinating and challenging catalog of areas where work needs to be done.

Secondary and tertiary oil recovery techniques need to be perfected as does oil shale technology and improved techniques for surface and underground coal mining. We need new technology that will permit environmentally acceptable use of our vast coal and oil shale resources; pressurized fluid bed combustion systems; coal gasification and liquefaction; new nuclear technologies; and programs to exploit our renewable energy resources including fusion, solar and geothermal energy. This is just a partial list of the areas of challenge, and one of the problems we have is to change this from a broad list to a focused effort. This will require judgment and skill and you are part of that.

This is the technological side of the energy problem, and you know it in more detail that I would ever presume to discuss.

Let me turn briefly to the second aspect of the challenge which is not technological but institutional, and is perhaps the principal reason for your coming together with us particularly with Mr. Kauper, Mr. Bakke and some of the other speakers on the program today.

As Lincoln said, we must think anew, we must act anew, we must disenthrall ourselves.

Some of the institutional needs are quite clear, though difficult to fulfill. For example, deregulation of natural gas at the wellhead will have opposition in Congress. Another example which involved administrative arrangements is rapid outer continental shelf drilling off the Atlantic and Pacific coasts including an appropriate leasing program of 10 million acres wedded effectively to coastal zone management in order to protect the ecology. I think progress is being made on this.

It is interesting to note that Dr. White of our National Oceanic and Atmospheric Administration says that of all of the potential areas for additional resources, the most ecologically satisfactory involves the use of the OCS. So, this administratively possible approach, it seems to me, is one upon which to concentrate.

I think, also, new institutions perhaps are required in coal gasification and coal liquefaction. I speak of the institution of a guarantee by the United States Government of a price for such synthetic fuels sufficient to assure the profitability, or at least the non-loss, of such an operation should the OPEC countries decrease the price from $11 to $3 as rapidly as they increased the price from $3 to $11. This is an area where I think further exploration is needed by you gentlemen, your Congressmen, and this Government. We need to assure a guaranteed price over a long enough term to permit investors to amortize their investment in research and the development and in the construction of commercially feasible as opposed to bench model or pilot model synthetic fuel systems.

Such are the kinds of institutional changes that need attention and thought.

There is also the question of what institutional change may be needed and appropriate in order to permit cost and risk sharing within the limits of the antitrust laws -- that is the tough part of it -- to generate effectively further research and development in these numerous fields that I have mentioned. There needs to be an exploration of every means available to permit sharing of the burden of the larger investments and higher risks involved, and I sincerely hope that in this seminar today there will be a beginning of such an effort. We need a national dialogue on this whole subject of sharing the costs and risks together.

I urge you to consider the desirability and the possibility of risk-sharing ventures. In addition to private sector joint cooperative ventures, we should explore optimum modes of Government-industry cooperation.

The two gentlemen whom I referred to, Messrs. Kauper and Bakke, I think have very practical and very candid comments to make on this whole subject as they confer with you.

I think we should note as background that our competitor countries for world markets -- Canada, France, Germany, Japan and the U.K. -- are all devising new institutions which suit their backgrounds to deal with this very problem at this very time. It behooves us to disenthrall ourselves to think anew and to act anew in this very area without letting go of the fundamentals in this country.

I would like just to say this: Yes, there is a certain amount of appeal to the Japanese approach where there is kind of a partnership between the banks and industries and Government and the labor unions. But, remember, there are two sides to every one of these coins. If the Government is to enter into the partnership, there is also the problem of how far the Government enters into it and what the Government's price is. The genius of this country includes the fact that there has been an arm's length relation between Government and the private sector and you have had more freedom as a result of that. With every bit of Government support and assistance comes various burdens and don't forget it.

Likewise, I think the ultimate genius of this country lies in free and vigorous competition as opposed to cartelism. It is this series of contradictory appeals that men and women of your stature can help this country a great deal with, if you will deliberate and give us your judgment and your views.

Speaking of institutions, finally, I would only want to stress again the element of competition. I have earlier mentioned the possibility of long-term guaranteed contracts for the production of synthetic fuels. One of the options that is under consideration in the Government at this time involves just this. But one of the aspects of this particular proposal is that the selection of the winning contract is the result of sealed bid competition.

Yes, let there be a long-term contract. Yes, let it be guaranteed. But let's get the Arcos, Exxons, Union Pacifics, and Continental Oils, and all the rest of them to make sealed bids for these contracts. Let the competition to be "firstest with the mostest" in the area of synthetic fuels be the force which presses down on the price which will ultimately be guaranteed.

This theme of competition is a lively and vital one and we must not abandon it even in our need to achieve a solution to our energy problem. I think that the gentlemen who will speak later in the program will speak eloquently on this whole area of competition. All I would do is to remind you that it is the mainspring of our vitality.

Finally, there is the challenge not only of technology and of institutions, but the challenge that we face of the political will to take on these challenges, meet them and prevail. No words can accomplish this. We either have that as a Nation or we don't have it as a Nation.

You have all read Toynbee. You all know that civilizations meet challenges from year to year, decade to decade. Those civilizations which confront challenges but lack the will, the fiber, the ability to mobilize the brains and the institutions and the resources -- whether they be material, human or spiritual -- to meet the challenges decline. Ancient Greece declined, and so did Rome.

It is now our turn to meet once again a vital challenge, to our institutions, our ingenuity and our will. There is no insurmountable lack of material resources. There is no lack of brains in the room and behind you in the companies you serve. There is no real lack of money to get it done.

But we can dibble and dabble and we can decide not to decide and we will fail. Or, as Lincoln said, we can meet the challenge. We can disenthrall ourselves and we can save our country.

We salute you for this meeting today and hope that there will be real progress in meeting the technological challenges, the institutional challenges, and the challenges to our political will as a result of this meeting.

## OPENING OF MORNING SESSION

S. WILLIAM GOUSE, JR.
Director, Office of R&D, and
Acting Director, Office of Coal Research
U.S. Department of the Interior

There are two program changes that you might like to know about.

The third speaker this morning was listed as Mr. Clewell of Mobil Oil. He will be replaced by John Socolofsky, Manager of Service Products of Mobil Oil.

There is a speaker added this afternoon, after Mr. Philip White of Standard Oil of Indiana. That will be Dr. Robert Seamans, Administrator of the Energy Research and Development Administration who will make a few extemporaneous remarks.

Now, this morning's program.

The basic thrust and title is Institutional and Legal Constraints to Cooperative Energy Research and Development. We are interested in this from another point of view. We are not only concerned with trying to improve cooperation between various parts of the industrial sector, we are also interested in making it easier for industry to cooperate with the Government in various types of joint ventures. So we are listening this morning to see what we can learn and take back to our solicitors and people who set our contracting policy, which might make it more interesting for companies not only to cooperate with each other, but to cooperate with us.

The first set of statements this morning will be overview statements on constraints to formation of R&D consortia and the first speaker will be Mr. William D. Carey, Member of the Commerce Technical Advisory Board and Vice President of Arthur D. Little, Inc. The very first effort of the Commerce Technical Advisory Board's study involved a preparation of a white paper entitled "Industry Collaboration in Energy R&D, Perspectives on the Regulatory Setting." This paper was prepared after consulting with the antitrust staff; every seminar participant has received a copy of that paper. Mr. Carey, the principal author of this paper, will provide the overview statement on constraints.

The second speaker this morning on constraints to formation of R&D consortia is Dr. Les Cuthbert. At the advice of the CTAB, the Department of Commerce contacted the Industrial Research Institute to assess industry's perceptions of the constraints to cooperative energy R&D and to accumulate some actual case histories to document the perceived constraints. Four of today's speakers will describe cases covered by the IRI study. Dr. Cuthbert is the principal investigator of the IRI study. He will give us an overview of that study and its significance for today's seminar.

The first specific constraint to be discussed is the fear of antitrust violations and we will begin with two representatives from industry who will describe two pertinent case histories. After the coffee break, they will be followed by two Government spokesmen who will comment on Government policy in this area.

The first case will be presented by John Socolofsky. This case history involves an effort to create an inter-industry R&D program on engine emission controls. One of the companies involved in that effort is the Mobil Oil corporation. Mr. Socolofsky is the Manager of Product Research and Technical Services.

The last segment of the formal morning session before opening it up to questions will be devoted to two Government representatives.

Undoubtedly the most important view is that of the Department of Justice. To begin the Government's side, we have the Honorable Thomas E. Kauper, Assistant Attorney General for the Antitrust Division, who will present the Government's viewpoint.

The final speaker this morning is the Honorable Karl E. Bakke, General Counsel, Department of Commerce, who will spell out the Commerce Department's interest in exploring the consortium approach to R&D in the energy area.

After Mr. Bakke's remarks we will entertain questions and general discussion from the floor.

# THE QUESTION OF BARRIERS TO INDUSTRY COLLABORATION IN ENERGY R&D

WILLIAM D. CAREY
Member, Commerce Technical Advisory Board

I will be brief. I have little choice. The Commerce Technical Advisory Board is unlike most Government advisory committees, in that it tries to get something done. In this particular case, CTAB took a hard look last Spring at the dimensions of the "energy R&D" agenda being proposed by the Federal Government, and rapidly concluded that there would be both a great deal of waste motion and wasted Federal R&D funds in the absence of economies of skill and scale.

The question was, can greater efficiencies in the management and performance of energy-related R&D be attained in the face of policy and regulatory constraints on collaborative effort? The next question was whether the constraints were as formidable as some of us assumed them to be. We set out to find out, and we went to the people who ought to know, the regulators themselves. What we heard cheered us up considerably, even though it didn't allay all our concerns. The answer seemed to be, "Well, it all depends." That was fair enough, and to find out what it depended on, we in CTAB set ourselves to write a working paper which would say as much as we could properly say while representing the views of the Justice Department fairly. That paper is before you today.

In its essence, I think the message comes through: there are constraints on what companies can do in collaborative R&D, and the chief constraint is that collaboration must not turn out to restrain competition unreasonably. There is no blanket antipathy to collaboration, by any means. The point is that it must satisfy some tests.

In our so-called "white paper," CTAB is really doing no more than communicate to you what we take to be the best judgment of the Department of Justice on this matter, in the form of general guidelines. The paper does not constitute a hunting license to establish collaborative R&D, nor does it give absolution in advance to mistaken or anticompetitive forms of collaboration. But it does point out some of the structural features of joint R&D which could go a long way to diminishing the chances of getting into antitrust trouble. This guidance, plus CTAB's advice to industry to take advantage of the assistance of both the Commerce Department and the Business Review Procedure of the Justice Department, add up to our belief that there is more room than you might think for ventures in collaborative R&D while staying within the bounds of antitrust policy. As the paper says, "An R&D consortium need not breach antitrust policy, and there is no prima facie reason why a consortium is a threat to competition. The question turns on the form, structure, and characteristics of the consortium." And the regulators are willing to help you think the question through, in each case, before you commit yourself.

We learned that to make an antitrust challenge stick, two tests arise. The first is to prove that there has been concerted action among the parties. That alone, however, doesn't add up to a violation. The second test is the serious one: a showing that the concerted action results in an unreasonable restraint of competition. This is where CTAB counseled with the Justice Department before suggesting six features for the design of a consortium which, if adopted, can go a long way to defuse the issue.

First, we have suggested that multiple R&D consortia, competing with each other, could achieve the needed efficiencies at low risk of antitrust sanctions.

Second, we suggest that even where there is only a single consortium, it will help if competing R&D teams are built into its structure for independent R&D.

Third, we say that a consortium limited to basic research would run very little risk, but on the other hand, it won't be too helpful if a consortium which is concerned predominantly with sharing applied R&D merely adds some sweetening in the form of basic research. The basic research, in that case, probably won't absolve the consortium.

Fourth, we say that the appearance of restraint on competition would be materially reduced if the consortium includes participation by small or medium firms which would benefit from the scale, resources, and risk capabilities of the larger participating firms.

Fifth, to the extent that proprietary rights in joint R&D outcomes can be shared out with competitors, the chances of antitrust problems can be lessened.

And lastly, since the aim of joint R&D is to advance innovation, the consortium should be wary of any actual or apparent collusion to delay or sequester, the application of R&D results; and one way to protect against this is to provide for representatives of the public to monitor decision making.

That is about where CTAB comes out after consulting with the Justice Department. Plainly, a consortium for R&D will involve some variance from business-as-usual if it is to avoid the risk of sanctions. What each company must decide for itself is whether the benefits offset the problems. Our viewpoint is not that we should proliferate consortia just because the idea has such intrinsic beauty, but that where it makes sense for firms to pool their R&D efforts for the sake of the energy crisis they ought not to be driven off before they get started because of the spectre of rocking the antitrust boat. So far as we have been able to learn, there is as yet no court holding on the merits of joint R&D from the antitrust standpoint. The question does not seem to have been tested judicially. What we do have, however, is an administrative process for feeling out the attitude of the Justice Department in advance of creating a consortium, and we urge you to use it.

# STUDY OF LEGAL AND INSTITUTIONAL BARRIERS TO INDUSTRY PARTICIPATION IN COOPERATIVE RESEARCH AND DEVELOPMENT

F. L. CUTHBERT
Principal Investigator
Industrial Research Institute

As we will hear today, primarily because of the capital intensive nature of much energy R&D, the high risk involved, and in order to marshall our best R&D talents, cooperative energy R&D should be considered. However, as the title of our seminar indicates, it is recognized that constraints to cooperative R&D may well exist.

In mid 1974, the U.S. Department of Commerce let a contract with the Industrial Research Institute, Inc., for a "Study of Legal and Institutional Barriers to Industry Participation in Cooperative Research and Development." It is the purpose of the study to determine industry's perception of legal and institutional constraints which would inhibit or discourage industry from engaging in cooperative R&D of the following types:

1. Industrial Consortia
2. Joint Industry-Government R&D Programs
3. Joint Programs on an International Scale

The availability of case histories illustrating industry's perceptions of constraints to joint programs of the types mentioned was to be determined, and, if available, were to be documented. Interest in case histories was not limited to energy technologies; but included any effort demonstrating constraints to cooperative R&D.

The study concluded, that indeed, U.S. industrial R&D management is very perceptive of constraints to cooperative R&D. They are concerned over these constraints, and this concern has a real impact on their R&D planning, and their consideration for engaging in cooperative energy R&D.

## METHODOLOGY

The study was initiated by arranging for in-depth interviews with the top R&D managers of several I.R.I. member companies, who, on the basis of first hand knowledge, were believed to have had experience with cooperative R&D. In the meantime, a letter and questionnaire was prepared for circulation to the I.R.I. membership.

Responses to the questionnaire provided information both on industry's perception of constraints to cooperative R&D and leads for additional interviews.

## QUESTIONNAIRE SURVEY

The letter, accompanying the questionnaire, fully explained the background of the study being conducted by the Industrial Research Institute under contract to the Department of Commerce. The letter and questionnaire were mailed to the top R&D managers of 223 U.S. member companies of I.R.I.

The three questions asked were simply:

1. Do you consider barriers to be a problem in conducting cooperative R&D?
2. Do you have any case histories illustrating barriers?
3. Would you be willing to discuss case histories?

Replies were received from 105 companies or 47 percent of those queried. The industrial classification of the companies responding to the questionnaire represented a good cross-section of American industry as indicated:

| | |
|---|---|
| Chemicals | 22 |
| Electrical | 6 |
| Metals | 10 |
| Petroleum | 16 |
| Food | 9 |
| Machinery | 15 |
| Paper | 6 |
| Glass | 3 |
| Pharmaceutical | 3 |
| Other | 15 |

The "other" classification includes rubber, building materials, direct consumer products, textiles.

Not all respondents answered all three questions. Of those responding, 80 percent considered constraints to be a problem in conducting cooperative R&D and about half of these indicated they had case histories.

## INTERVIEWS

Based on first hand knowledge of the company's activities and information gained from the questionnaire, in-depth interviews were conducted with the top R&D manager or his representative of 35 Industrial Research Institute company members. In several instances, a law department or patent man joined in the discussion. While a majority of the companies interviewed would be classified in the chemical and petroleum categories, other companies were chosen deliberately to provide somewhat of a cross-section of industry. The actual industry classification of the 35 companies interviewed follows:

| | |
|---|---|
| Chemicals | 7 |
| Electrical | 3 |
| Metals | 4 |
| Petroleum | 8 |
| Machinery | 4 |
| Paper | 2 |
| Pharmaceutical | 2 |
| Other | 5 |

Again, the "other" category included rubber, building materials, direct consumer products, and textiles.

Interviews took the form of first discussing the company philosophy with respect to cooperative R&D and managements perception of legal and institutional constraints to such work. The impact, if any, of concern for constraints on the R&D planning process was discussed.

Actual experiences of the company with cooperative R&D programs were reviewed. Industrial consortia, joint industry-government R&D programs, and joint programs on an international scale were considered. Finally, the interview provided an opportunity for comments pertaining to any phase of the study; i.e., antitrust, patent policies, federal agency practices, etc., being brought forth and discussed.

The interviews revealed that R&D managers are very perceptive and sensitive to both legal and institutional constraints to cooperative R&D. While the policy of the company toward cooperative R&D was very seldom reduced to writing, it was evident that most companies did have a policy which was clearly understood and adhered to. As one might have expected, the philosophies of the companies varied greatly; from one of desiring and seeking joint programs of the consortia type and/or with the Government, to one of engaging in such programs only under specific circumstances. The circumstance most often mentioned was when the technology involved was one of unique interest to the company, one to which they could contribute, but had not yet built up a background technology position. Some companies would not consider cooperative work at the research level, but only at the development stage. This approach provided an opportunity for them to develop a proprietary technology background and patent position before seeking outside assistance. Yet another company considers cooperative work only on processes. Because of their concern for maintaining their patent position they would not engage in joint R&D on products. The relative size of the company within its industry has a direct impact on its philosophy with respect to engaging in joint R&D. Generally, the larger the company in terms of sales dollars, the more sensitive they are to the impact of antitrust policies on cooperative R&D. The dominance of a company in a particular market also served as a factor in setting policy for cooperative R&D. A company being relatively dominant in one market would not consider R&D in that field because of concern for antitrust. They would consider cooperative R&D in other fields.

Case histories illustrating constraints to cooperative R&D were sought during the interviews. It was found that while several companies had indicated, when responding to the questionnaire, having case histories documenting the effect of constraints on their consideration to engage in cooperative R&D, the number of instances that could be adequately documented and publicized were somewhat less than expected. Nevertheless, documented case histories were obtained and four of these will be presented here today.

One would have also expected a larger number of case histories being available, considering that 89 companies or 80 percent of those responding to the questionnaire stated that they considered constraints a real problem in attempting to conduct cooperative R&D. The fact that case histories were not more common was explained rather simply by several interviewees by stating - "We have learned to live within the rules of antitrust, and therefore, the question as to whether or not to engage in cooperative R&D or case history never develops."

Another comment, typical of several responses, was to the effect that R&D programs are carefully planned in advance and if antitrust or patent problems were anticipated the program was never activated.

Companies expressed a real concern, when considering cooperative R&D; over antitrust in programs involving joint company endeavors, over patent rights and protection of proprietary information when concerned with joint industry-Government programs, and over a third category, "other", largely concerned with governmental operations and their relationship to the government. The constraints to cooperative R&D classified as "other" can best be illustrated by a number of comments pertaining to this condition. No significance should be attached to the order in which the comments are offered.

1. The great risk in energy R&D today is the question of the future price of oil. The price today is politically oriented. If it were a free market, industry could evaluate the market and assume risks as they have been accustomed to doing; but they cannot do this when the future price is so subject to political pressures.

2. The extended paper work and time involved in negotiating and getting approvals for Government contracts acts as a constraint to cooperative R&D. Government contracts are frequently not sufficiently flexible to allow optimum performance.

3. There is a considerable variation in patent policies between Government agencies. The energy R&D program would benefit from more of a unified approach. There

should be a commonality of approaches among the agencies. It was suggested that the energy R&D program would benefit by being structured in the same manner as NASA or DoD.

4. People were stated to be a real constraint to cooperative R&D. At times difficulties are experienced in having company people work in complete harmony and with a common purpose with Government agency people. References were made to an adversary atomosphere that occasionally appears to exist between Government and industry, that apparently does not exist in most foreign countries. There was some concern that there is a real scarcity of well qualified people to do the necessary R&D. In the same people problem area, the ultra conservative attitude of some company law department personnel, particularly toward situations involving possible antitrust, was mentioned. The constant change of personnel in Government results in changes of philosophies, policies, etc., - what is ok today, may not be tomorrow.

5. Some type of economic incentive to industry would make joint Government-industry contract work more attractive. Subsidization of price when a large demonstration plant is built was a possibility that was mentioned.

6. Concern was expressed over the possibility of changing ground rules with respect to antitrust. The question was phrased - "Is cooperation essentially anti-competitive?"

Based on the discussions during the interviews, an attempt was made to weigh the company concern with each of the defined constraints; patent policies, antitrust, and "other." Concern for patents and antitrust was essentially equal in that 18 to 20 of the companies were judged to consider these constraints of most concern. It was indicated that 12 of the companies would consider the "other" category of constraint to be most important. In this rating the numbers do not add up to the total of 35 companies interviewed since serval companies were judged to give equal weight to two or three constraints. While the rating is somewhat subjective, it does indicate the relative criticality of each type of constraint. Of particular interest is the level of importance attached to the "other" types of constraints. One of the case histories to be presented here today deals with one of these: "Government delays as a deterrent."

In summary, it should be noted that U.S. industrial R&D management is very perceptive of constraints to cooperative R&D. They are concerned over these constraints, and this concern has a real impact on their R&D planning and their consideration for engaging in cooperative R&D, either with other companies, or in joint industry-Government programs, or programs on an international scale.

# COOPERATIVE INDUSTRY RESEARCH -

# FEAR OF ANTITRUST VIOLATIONS AS A DETERRENT

## CASE HISTORY: INTER-INDUSTRY EMISSIONS CONTROL (IIEC) PROGRAM

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Product Research and Technical Service
Mobil Oil Corporation

As you listen to this Case History, please keep in mind that it is being presented -- not by a lawyer -- but by a researcher. It reflects the viewpoints of scientists and engineers who, for more than seven years, have dedicated their efforts toward the abatement of automotive vehicle pollution. These researchers have been responsible for setting technical objectives and assigning priorities, as well as for conducting research projects to provide technology needed for reducing automotive emissions.

Overall, the IIEC program has been a successful joint research endeavor -- the results of which, as a matter of policy, have been fully and completely published in a continuing series of technical papers and reports. IIEC has provided basic technology for many of the emission control systems in use on today's automobiles. And the program is continuing. However, its progress and achievements have been adversely affected by a number of legal constraints, uncertainties and delays surrounding the program. The purpose of this Case History is to review with you some of the problems we have encountered.

### Origin of IIEC

In his special message on air pollution delivered to Congress on January 30, 1967, President Johnson urged private industry to "commit themselves more fully, more effectively, and with a new sense of urgency to America's struggle against poisoned air" and requested the Secretary of Health, Education and Welfare to encourage industry to abate pollution.

Recognizing an obligation to help reduce automotive emissions, and believing a cooperative "systems approach" offered the best opportunities for success, Mobil Oil Corporation and the Ford Motor Company signed an agreement on April 21, 1967 to carry out a three year, $7,000,000 research effort designed to accelerate development of a virtually emission-free, gasoline-powered vehicle. All qualified companies were afforded an opportunity to join this cooperative effort, which came to be known as the Inter-Industry Emission Control (IIEC) Program.

Under provisions of the formal Agreement, nine additional companies joined the IIEC by July, 1968: Amoco Oil Company; Atlantic Richfield Company; Fiat, S. P. A.; Marathon Oil Company; Mitsubishi Motors Corporation; Nissan Motor Co., Ltd.; The Standard Oil Company (Ohio); Sun Oil Company; and Toyo Kogyo Co., Ltd.

In addition, "Know-How" Agreements were executed with Volkswagenwerk A.G. in 1970 and with Toyota Motor Co., Ltd. in 1971.

## IIEC Research Approach and Goals

From the beginning of IIEC, one portion of the program has been concerned with engine hardware and concept vehicle development, and this has been carried out by the automotive participants. Another portion has been primarily chemically oriented, examining fuel composition, additives, lubricants, catalysts, and chemical engineering developments. These studies have been carried out principally by the petroleum companies. Thus, the expertise of both industries was best utilized for optimum research efficiency toward the accomplishment of a common goal.

The original program included 15 projects, varying from the search for combustion-improving additives to several explicit studies of catalyst and thermal reactor development, math modeling, catalytic processes, hardware development, and, finally, low-emission concept vehicle development.

By mid-1969, significant progress had been made. Five different vehicle concept types showed promise of meeting the IIEC goals. It was apparent, though, that these promising systems could not be fully demonstrated by the program expiration date of April, 1970. Thus, the member companies agreed that the program should be extended.

A complicating factor was the Consent Decree of October 16, 1969, which prevented Ford from undertaking new cooperative research in the control of automotive emissions with any other automobile manufacturer having a 2% share of the world vehicle market. Two other IIEC members, Fiat and Nissan, were in this category.

Ford petitioned the U.S. Justice Department to be allowed to continue in the program. The Justice Department approved Ford's request, but allowed that Ford could continue only through 1970 and that no new projects could be initiated. One project eliminated by the conditions of the extension was a cost/benefit analysis by an outside contractor. Thus, both the program and -- because of IIEC's policy of publication -- the public were denied a cost/benefit analysis on emissions control technology at an early date.

We wish to make it clear that we are not in any way criticizing the Judgment in U.S. versus AMA, or any personnel in the Antitrust Division. We believe the antitrust laws are important in the assurance of fairness in business relations and in the protection of the public interest. Our purpose in reporting this Case History is to demonstrate how antitrust action has impinged upon an ongoing joint program which we believe is in the best interest of the general public. We were faced at this point with abandoning a promising program or the alternative of trying to complete the program despite the fact that the Consent Decree tended to make further cooperation difficult.

Nevertheless, good progress was made. By the end of 1970, durability data on concept vehicles demonstrated that some concepts could meet the original IIEC goals for 50,000 miles. This was judged to be a major accomplishment, since the IIEC goals (0.82 grams of hydrocarbons per mile, 7.1 grams of carbon monoxide per mile based on the 1970 Federal Test Procedure) were more stringent than any of those required or projected by the Federal Government up to that time.

## Impact of the Clean Air Act Amendments of 1970

The Clean Air Amendments of 1970 established exhaust emission control requirements far more rigorous than previously anticipated. They were even more severe than the original stringent IIEC goals. The new standards, adopted by an Act of Congress, required a reduction in hydrocarbons and carbon monoxide of 90% by 1975, and a reduction in oxides of nitrogen of 90% by 1976, from the already reduced levels of 1970 and 1971.

While these drastic changes in Federal standards were being debated in Congress, the IIEC participants considered whether any attempt should be made to extend the program. We knew that the IIEC "systems approach," which combines the expertise of both the automotive and petroleum industries toward the achievement of common objectives, offered the best opportunity for rapid progress. Continuing the program would, however, require Ford Motor Company to again petition the U.S. Justice Department, under the Consent Decree, for approvel. Legal advice indicated that such approval would be time-consuming and difficult to obtain.

About that time, Mobil explored with various members of the Senate Public Works Committee the advantages of a law that would permit auto and oil companies to work together on the problems of automotive air pollution. This would have made it unnecessary for Ford to go back to the Justice Department each year for an extension, and also would have made it possible for IIEC to undertake long-range research projects. This would be particularly helpful, since the new Federal emmissions standards could not be met without several years of research and development. Some of the Senators were very interested in our proposal, but they finally decided that such legislation would have little or no chance of passage.

Although IIEC could have continued without Ford Motor Company, a major U.S. engine builder was needed for an effective and efficient research program. So, Ford once again petitioned the Justice Department to be allowed to participate in the proposed IIEC continuation. Permission was obtained during the last week in December. A significant, helpful factor in obtaining approval was a written judgment by EPA that the extension would be for the public good. Because of the time interval between Ford's petition and the Justice Department's positive ruling in late December, time was lost on project planning and initiation.

Two additional one-year extensions were granted for 1972 and 1973. For both years, a favorable ruling by the Justice Department came in late December. At the end of 1973, the program expenditures had totaled $21 million, and significant progress had been made toward meeting the new IIEC program goals.

## Other Deterrents to IIEC Program Progress

It was mentioned previously that "know-how" agreements were executed with Volkswagen and Toyota. (Each company had over 2%of the world vehicle market.) These companies were provided with all technical information obtained in the IIEC project work, but they were not allowed to participate in project planning, nor could they provide research results to Ford because of the Consent Decree. Thus, the program was denied the technical expertise of these companies. Because of these restrictions, Volkswagen withdrew from the program at the end of 1972.

## IIEC-2 Expanded Goals Covering Emissions and Energy Conservation

In mid-1973, it became evident that conservation of energy was becoming as important as controlling emissions. Thus, a proposal was adopted unanimously by the IIEC participants to redirect the goals toward the long-range objectives of energy conservation as well as meeting low emission levels.

In November, 1973, Ford requested permission from the U.S. Justice Department to continue in this redirected effort, planned as a new three year program (1974-1976). Final Justice Department approval was obtained in October, 1974, nearly a year after Ford's request.

Although the Justice Department had allowed Ford to participate in the proposed IIEC-2 program on a tentative basis, from January to October, 1974, there was much confusion and difficulty in planning and carrying out project work during 1974 until formal approval was finally obtained. In addition, instead of approving the three year program as requested, the Justice Department ruling covered only two years; namely, the remainder of 1974 and the year 1975. Because of this, some of the proposed longer-range projects had to be reconsidered and their objectives revised to accommodate the two year restriction.

The conditions set forth by the Justice Department for Ford's participation in IIEC-2 presented a number of difficulties for the participants. For example, the Justice Department required that any background patent blocking the use of an invention made in IIEC-2 must be made available by license to other IIEC-2 participants and third parties.

The IIEC-2 program includes a project on alternate power plants. One of the original IIEC participants, Toyo Kogyo, felt that the above provision on background patents could require their providing licenses to IIEC-2 participants and others on all of their prior background patents on rotary engines. Toyo Kogyo found this unacceptable, and declined to join the IIEC-2 program. Thus, the program was deprived of an enthusiastic and capable participant.

## Summary

The IIEC Program has produced good results. But the constant uncertainties about the future of the program have made long-range planning difficult and sometimes impossible. As a result, some projects could not be initiated; others received less than full commitment; and the total potential contributions of this major cooperative Clean Air Research Porgram were materially restricted.

# CASE HISTORY OF THE SMELTER CONTROL RESEARCH ASSOCIATION

DAVID SWAN
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Kennecott Copper Corporation

The case I shall present is related to an industry sponsored research effort to develop new technology for removing sulfur oxides from the gaseous effluents of copper smelters. In order to give you an overview of the problem, I will briefly review the state of the smelting art, describe the problems posed by enactment of new environmental regulations, and discuss actions of the smelting industry to develop new technology through the medium of a nonprofit research association. Finally, I'll discuss the interaction of this activity with government policy statements.

## COPPER SMELTING TECHNOLOGY

About 90% of the copper produced in the United States derives from sulfide ores. Typically, these ores are concentrated by crushing and fine grinding, followed by froth flotation, which yields a finely divided concentrate containing about 25% copper with a like amount of sulfur; the balance of the concentrate being iron and gangue materials such as silica, alumina, magnesia, etc. The remainder of the ground ore is discarded as tailings. The concentrates are then smelted to a crude copper metal in a two-stage pyrometallurgical process. The first stage consists of feeding the concentrates into a reverberatory furnace - a shallow hearth vessel, fossil fuel fired - whose purpose is to partially oxidize the charge to a copper-iron-sulfur alloy called "matte." The gangue materials are floated off as a slag, while approximately 50% of the sulfur escapes as $SO_2$ gas, which, when mixed with the products of combustion produces a hot effluent gas typically containing from 1½ to 3% $SO_2$. The "matte" is periodically tapped and transferred to a converter, a cylindrical vessel with tuyeres, to permit the introduction of air which oxidizes the iron and sulfur to produce a crude grade of copper metal called "blister copper," a slag, high in iron oxide, and $SO_2$ gas. Because the converter reaction is exothermic, it is not necessary to provide additional fuel, and therefore, the effluent gas, now diluted with air is of sufficient strength to serve as a feed material for contact sulfuric acid plants (5-15% $SO_2$). In contrast, the $SO_2$ in the reverberatory effluent is not sufficiently concentrated to enable fixation by this method. Thus, the problem of controlling emissions from the copper smelting industry divides into two aspects; one of which is achievable with state of the art technology which would account for up to 60% of the sulfur fed, with the second comprising the reverberatory off-gas not treatable with commercially proven technology. Recognizing this, the National Air Pollution Control Agency in 1968 engaged the Arthur G. McKee Company ( a firm experienced in smelter design and construction) to identify promising research approaches to the problem of capturing sulfur emissions from copper, lead, and zinc smelters. In carrying out the assignment, McKee identified a number of technologies for possible application to smelters, including lime or limestone scrubbing which had been applied to remove $SO_2$ from a British power plant before World War II.

Following the issuance of the McKee report, NAPCA proposed to several states that they adopt an emission standard of 90% sulfur capture as a requirement, citing the McKee report as evidence of the feasibility of limestone scrubbing. To the best of my knowledge, there was no attempt by NAPCA or its successor, EPA, to undertake a research program to experimentally verify that the technical routes recommended by McKee as promising avenues for research were in fact feasible as applied to smelters.

Mr. Plato Malozemoff, Chairman and Chief Executive Officer of Newmont Mining Corporation, suggested that those companies in the United States engaged in copper smelting should undertake a research and development program to determine the feasibility of removing sulfur from the lean gas streams produced by reverberatory furnaces. Such an effort was organized, and on May 11, 1971, incorporated into a non-profit research corporation called "Smelter Control Research Association." The funding participants included all of the U.S. copper smelter operators. The first major project of the organization was to build a pilot plant at the McGill, Nevada, smelter of Kennecott Copper Corporation, to determine the feasibility of lime or limestone scrubbing for copper smelter gas. Following completion of this, other major projects of the organization have included a study conducted jointly with the U.S. Bureau of Mines to examine the technical and economic feasibility of various scrubbing processes for possible application to smelters. In addition, a second generation scrubbing process involving a more sophisticated double alkali process has been constructed at the Magma Copper

Company's smelter in Arizona, and will shortly be in operation.

In accordance with the terms of its charter, the SCRA has published all of its results, both in the form of detailed reports, and as contributions to the technical literature. A government agency, the U.S. Bureau of Mines, has also conducted significant experimental work on two scrubbing processes, namely the alkalized alumina process which was not successful, and the citrate process which is being pilot planted at a lead smelter in Idaho. I think it is safe to say that these two programs represent almost the entire technical effort in the world on this approach to pollution abatement. There has been substantial effort to develop scrubbing processes suitable for weak gas streams for application to steam power plants. To date none of these processes has achieved performance criteria suggested by the National Academy of Engineering as a proof of feasibility, although sufficient progress has been made to make technical success probable. Economic costs, however, will be high, and further development will be necessary to apply processes suitable for utilities to nonferrous smelters.

## ENVIRONMENTAL CONSTRAINTS

Prior to the enactment of the Clean Air Amendments of 1970, pollution control technology for copper smelters generally consisted of venting $SO_2$ bearing gases to the atmosphere through high stacks. Particulates were captured with Cottrell electrostatic precipitators, a well developed technology. A few smelters treated converter effluents in contact sulfuric acid plants, capturing up to 60% of the sulfur emissions. In two smelters, located in urban areas, ambient air violations were prevented by curtailing production when predicted weather conditions were unfavorable. Standards were developed and enforced by local or state authorities. In the late 1960's several states developed stringent emission control regulations with tight timetables for compliance.

After the enactment of the 1970 Amendments, the requirements for compliance with ambient air quality standards by 1975 severely limited the technical options open to the industry. Basically, the effect of the time constraints was to limit the approach to emission reduction to one of capturing emissions from existing smelters, and to defer major process changes to the future.

## POSITION OF THE DEPARTMENT OF JUSTICE

Having described the technological and regulatory aspects of the problem, I'll now outline some of the legal constraints facing any cooperative research program. I must hasten to point out these are a technologist's, not a lawyers opinion.

The basic thesis of Section I of the Sherman Act is simple: for joint research to be unlawful, there must be concerted action among the joint researchers resulting in an unreasonable restraint of trade. Joint or cooperative research activities are not _per se_ violations of the antitrust laws - that is, proof of the act itself is not sufficient to prove a violation, without any showing of the anti-competitive effect of the act. Obviously, an association such as SCRA is not set up to restrain trade. Unfortunately, Department of Justice policy, as expressed by members of the department, does not provide useful guidelines for those contemplating joint research efforts.

Mr. Barry Grossman, one lawyer in the Department of Justice Antitrust Division, who specializes in pollution control, was quite specific in his remarks at a special conference on air and water depollution held in Washington, D.C., in March 1970. The following is part of what he said:

"As a general rule, our economic policy has favored the competitive rather than the collaborative approach. The results have been more than satisfactory in economic terms. In view of this experience, I suggest that we should not casually reject a competitive approach to solving the problem in the absence of strong evidence that a collaborative approach would be more effective. While it may well be appropriate to allow certain types of joint research effort in the pollution field, I think that we would be unwise to indiscriminately encourage joint research efforts or assume that the bigger the joint effort the better. At the present time, it is not clear that all pollution problems are of such a nature as to require industry-wide research efforts. Those empirical studies which have considered the question of economies of scale with respect to R&D and innovation, though far from conclusive, do indicate that in industries made up of relatively large firms, industry-wide collaboration is not necessary to obtain research economies of scale."

Grossman went on to say, "It should be kept in mind that where research is conducted on an industry-wide basis there is a danger that individual companies may resist innovation that would adversely affect their operations. In such circumstances the pace of innovation may be geared to the least progressive member of the industry with resulting detriment to society as a whole."

That concludes the quotation, which I believe succinctly identifies the problem faced by firms which perceive a need for joint consideration of alternative methods of achieving compliance with governmental requirements, particularly those containing mandatory timetables. Given the fact that the state of the technical art may be considerably behind the government's timetables, without joint research individual firms would be placed in an untenable position of either gambling that one or a few select potential solutions would achieve the results required, with the risk of disaster if the choice were wrong, or, alternatively, pursuing every potential solution with a tremendous strain on available resources.

Faced with those alternatives, responsible firms would prefer joint efforts to increase the chances of finding a solution to the problem, and would like some degree of certainty as regards the antitrust consequences of their actions. In addition, the real business competition to develop and sell pollution control equipment occurs among vendors of equipment and processes, not the using industry, particularly since the product development motive of such firms is to provide the marketplace with the best perceived value in control equipment and thereby obtain profits. By contrast, the development motive of the using industry is to permit continuation of their existing business, and the likelihood of a user ever developing control equipment which it could convert into a viable business venture seems almost nonexistent.

I believe the Department of Justice appears to be blurring the distinction between permissible and unlawful activities so as to persuade businessmen into pre-clearing their activities with the Department under what seems to be a rather unsatisfactory Business Review Procedure, which provides no criteria whatsoever for determining what is considered acceptable joint effort. In the absence of such criteria, consider the guidance provided by Donald I. Baker on April 18, 1972, when, as Director of Policy Planning of the Antitrust Division of the Department of Justice, he addressed the Subcommittee on Science, Research and Development of the House Committee on Science and Astronautics with respect to antitrust law and policy applicable to commercial research and development. Two quotes from Mr. Baker's statement should suffice to illustrate the Department of Justice's position, and I quote:

"Basically, the policy of the Department of Justice is to foster a climate conducive to competitive research efforts on an independent firm basis and through joint ventures which do not reduce the potential sources of innovation to a few firms. Conversely, we seek to discourage agreements and joint ventures which have the potential to significantly increase market power among a few firms by reducing incentives for independent research."

"Firms are not required to act at their own risk in engaging in joint research efforts. Where parties propose particular activities which they fear may come under antitrust scrutiny, the Department has available its Business Review Procedure whereby the Department will assess their proposal in advance for possible antitrust difficulties."

Taken as a whole, it appears to me that there is unnecessary uncertainty in this area. While business must continually deal with uncertainty, it should not be forced into anticipating capricious action by the Department of Justice.

I recognize that the Department of Justice does not agree that environmental research has few commercial incentives. Again, to quote Mr. Baker:

"It has been suggested, however, that in some important areas commercial incentives are insufficient to achieve some overriding social goal. Thus, it is claimed that where external social costs are imposed by an industry's operations, consumers will often not be willing to pay the price of the means to eliminate these externalities. This argument has been made with regard to pollution abatement products and procedures. Since consumers for steel or detergents will not be willing to pay a higher price for a product manufactured pursuant to "cleaner" procedures, the contention is that producers do not have commercial incentives to independently engage in pollution research."

"There may be some validity to such an analysis, but pollution abatement is perhaps an instance where a second look demonstrates that commercial incentives are indeed present. Two vital factors are operating in this area: First is the existence of governmental regulation over the emission of polluting substances, and second is the development of great public demand for "cleaner" procedures. This latter aspect may not only lead to still more stringent governmental regulation, but also allows manufacturers who take the lead in the antipollution fight to reap the benefits of consumer goodwill. Further, companies subject to governmental regulation have both affirmative and what we might call defensive commercial incentives to compete in the development of pollution abatement techniques. As an affirmative matter, a company which develops a superior product or process, and convinces the regulatory authority to adopt standards based upon the company's innovations would gain a significant competitive advantage. It would be in a position to sell to or license its competitors thereby obtaining financial gain for itself and imposing compliance costs on its rivals. It could also secure considerable public goodwill in the process. Looking at the matter from a defensive viewpoint, the innovator would be better able to meet new governmental regulations cheaply and efficiently without having to purchase somebody else's equipment. Of course, potential suppliers to the regulated industry would have all of the normal financial incentives to develop pollution abatement equipment for their potential customers. Thus, once society imposes or threatens to impose the external social costs of producing a product on its manufacturer, increased competitive incentives come into play."

On the basis of those unrealistic, and almost frightening policy statements, my concern that the business review procedure is less than satisfactory should not be a surprise. Accordingly, I would suggest that the Department of Justice rethink its policy as expressed by Messrs. Grossman and Baker, and issue guidelines which are based on consideration of the real world conditions surrounding energy and environmental research problems.

Perhaps the Department's representatives thought that their talks provided general guidelines. Even accepting this thesis, the need is for pragmatic and rather detailed guidelines which are permissive rather than restrictive and hold out hope rather than generate fear. With the tremendous technical uncertainties inherent in advancing the state of the art of controlling pollution, there is no sound basis for refusing to eliminate the legal uncertainties regarding joint research efforts. This seminar is an important first step in bringing the problem into focus.

Thank you.

# "INNOVATION INSURANCE:" PRIVATE OR PUBLIC?

THOMAS E. KAUPER
Assistant Attorney General
Antitrust Division
United States Department of Justice

I am happy to have the opportunity to address this seminar, because the Department of Justice places a high priority on the facilitation of research and development activities in the energy field. The energy needs of the United States and the world require creative, sustained and very expensive research and development efforts, and past experience indicates that in our diversified economy, much if not most of that effort will come from private firms. 1/ I am confident that American industry will successfully handle the technological problems and opportunities facing the energy sector of our economy. I also believe that the costs and risks of successful energy R & D will in some instances require joint efforts by firms, including competing firms.

Much has been written on that structure of industry which best promotes productive technological innovation. 2/ I believe the literature shows that many types of R & D can be carried on successfully by relatively small firms as well as large, and that an industry structure composed of competing firms contributes to rapid technological advances. But we are here this morning to focus on the structure and conduct of innovative efforts themselves; specifically, how can joint R & D projects be carried out consistently with the antitrust laws?

Just as I believe the technical challenges of energy R & D will be met, I am confident that joint ventures in energy R & D can get a reasonably accurate reading on possible antitrust risks and how to avoid them. The white paper prepared for this seminar by the CTAB staff is a good starting point in that regard. Of course, just as no technical expert can give you a formula for automatically dealing with all of the technical challenges presented by the full range of energy R & D projects, I as an antitrust lawyer can not give you a simple antitrust formula which can be applied to any such project without specific analysis of that individual project's objectives and effects. But if participants in cooperative energy R & D projects secure

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1/ F. M. Scherer, Industrial Market Structure and Economic Performance, 348-49 (2d Printing, 1971).

2/ See sources cited in Scherer, Chapter 15, pp. 346-78.

the same quality of advice from their attorneys as is required from their technical advisors, antitrust uncertainty should not impede worthwhile projects.

With respect to cooperative R & D, the goal of antitrust law is to maintain a system of competitive opportunities and incentives for private enterprises so that their independent initiatives will result in the optimum amount of productive innovation. People perform better when they are not insulated from either the rewards of success or the penalties of failure. As Judge Wyzanski stated in one celebrated antitrust opinion:

> . . . creativity in business, as in other areas, is best nourished by multiple centers of activity.
> . . . the preservation of any unregulated monopoly is hostile to the industrial and political ideals of an open society founded on the faith that tomorrow will produce a better than the best. [3]

Actions which deprive competitors of the opportunity or incentive to compete through R & D strike at the heart of the competitive process. For in the long run, competition through innovation is the source not just of efficiency, but of progress and an improved quality of life.

As the white paper notes, the courts have not categorized joint R & D arrangements as illegal per se, so that such arrangements may be challenged only after careful analysis of their actual effects upon competition under the particular facts relevant to the industry which is affected by the arrangement. The type of competition which obtains in the affected industry is relevant here because it may influence the impact of the R & D agreement upon competition in that industry. For instance, an industry which is less than vigorously competitive because of undue concentration or other factors unrelated to R & D may be extra vulnerable to the adverse impact of anticompetitive R & D arrangements. And clearly research and development may be more important to industries characterized by developing technology than in industries where the technology is mature. Even in the latter case, however, mature technology may soon find itself competing with tomorrow's infant technology - as the coal industry found itself competing with nuclear power. Also in the energy industry, the constriction of sources of foreign oil has led U.S. industry to a host of R & D proposals which were not actively considered before. Certainly the energy industry today tends to be characterized by a rather high competitive significance of R & D efforts.

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[3] United States v United Shoe Machinery Corp., 110 F. Supp. 295, 347 (D. Mass. 1953), aff'd 347 U.S. 521 (1954).

Some joint efforts in the R & D field may have no anticompetitive effects. The Supreme Court has ruled that the gathering and dissemination of competitively relevant information is not necessarily illegal, but may become so if the effect of such activities is to restrain competitive freedom or lead to collusive behavior. 4/ As activities move away from voluntary, open exchange of information toward agreements which directly affect the rights or properties of competitors, antitrust problems may be more likely to arise.

For instance, the Department has not challenged in court agreements purely for joint research, although it has investigated some. On the other hand, we have sued to enjoin patent pooling and technology interchange agreements where the effect of such agreements has been, in our view, to damage incentives to engage in innovative efforts or to acquire the innovations of others. In the *Smog* 5/ and *Aircraft Manufacturers* 6/ cases, the Department alleged that such detrimental results flowed from industrywide agreements requiring competitors to grant each other royalty-free or inexpensive licenses on innovations they developed, and essentially to cross-license all other members at the same royalty when purchasing innovations. The effect and purpose, we believe, was to prevent members of the agreements from gaining a competitive advantage from innovative activities, and conversely, to protect the members from any competitive disadvantage from each other's innovations. This arrangement protects the members from the normal competitive risks of non-innovation. Why should a firm strive to innovate when it gains no competitive edge when it does, but only gives its competitors a "free ride?" We believe innovative efforts ordinarily will be diminished by such agreements.

These cases should be borne in mind when one applies the principle that innovations developed by a joint R & D effort should be made available on a reasonable basis to competitors; clearly "on a reasonable basis" does not require such a low royalty as to destroy competitive incentives by creating a "free ride" problem. The courts require only that when

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4/ *Maple Flooring Manufacturers Association* v *United States*, 268 U.S. 563, 583-84 (1925); *American Column & Lumber* v *United States*, 257 U.S. 377 (1921); *United States* v *Container Corp. of America*, 393 U.S. 333 (1969).

5/ *United States* v *Automobile Manufacturers Association, et al.*, 1969 Trade Cases §72,907 (C.D. Cal. 1969).

6/ *United States* v *Manufacturers Aircraft Association*, 5 Trade Reg. Rep. §45,072 (S.D.N.Y. 1972).

competitors have through joint action created a resource, access to which creates a significant competitive advantage, that resource must be made available to other competitors on reasonable and nondiscriminatory terms. 7/

One concept which runs through all of the ideas the CTAB paper and I have discussed is what antitrust courts call "market power." To the extent that firms are able, because of their substantial share in the industry, to influence the behavior of their competitors, they are said to have market power. Clearly a joint research and development project among firms with substantial market power will have a greater influence upon competition than such a project composed of firms without substantial market power. Also, the scope and duration of a joint R & D project will influence the degree to which the market power of its participants is felt. When a joint R & D project brings together firms with substantial market power, or eliminates a firm or firms as a potential competitor, the coventurers should be prepared to demonstrate that, absent their joint undertaking, valuable R & D would not be performed and society would be the loser. It is because basic research is by definition of less immediate commercial significance, and less likely to be performed independently than applied research, that joint projects as to the former usually may be more easily justified. The approach is a practical, factual one; if joint R & D will benefit competition and therefore society more than solo efforts, antitrust law should not stand in the way.

This brings me again to the theme -- and title -- of these remarks: competition in R & D is to be maintained because it protects society from sluggishness and myopia, and minimizes the risks of wrong turns. Thus it is a valuable form of "innovation insurance," but for the general public, not for narrow private interests.

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7/ Silver v New York Stock Exchange, 373 U.S. 341 (1963); United States v Associated Press, 326 U.S. 1. (1945); and United States v Terminal Railroad Association, 224 U.S. 383 (1912).

# HONI SOIT QUI MAL Y PENSE

KARL E. BAKKE
General Counsel
U.S. Department of Commerce

In recent years, energy-related technological issues have presented more and more problems of paramount importance to all sectors of our society. In turn, both the governmental and the private sectors have mounted increasingly determined efforts to seek solutions.

Historically, the private sector and its many competing enterprises have been the breeding ground of ideas and of the initiatives that have sparked and fanned them into accomplishments. Nowhere is this more clearly demonstrated than in technological research and development by private industry. While the economic, energy, and ecological problems of today can perhaps be reduced in the short-term through governmental manipulation of economic constraints and incentives and through conservation, the long-term and enduring solutions will be through private sector contributions of technological innovation directed towards energy self-sufficiency, self-sufficiency of basic materials, reclamation of our land and cleansing and preserving our air and water resources.

The Department of Commerce has been increasingly concerned about mobilizing our Nation's resources for reaction to the challenges forced upon us by increasing demands for resources, such as basic energy supplies, and the concurrent decrease in the availability of those resources. At present, there are many different strategies being considered by the Nation to solve these problems.

One such strategy that appears to have considerable appeal and potential for success is cooperative research in the private sector. This strategy would enable companies to pool costs and resources to attain a stipulated R&D result in energy, pollution, or other areas. Such a joint R&D project would enable companies to share the frequently high cost and high risk associated with major research undertakings. Moreover, such companies by virtue of a consortium would be able to avail themselves of economies of scale, avoid duplication of R&D efforts, and accelerate development time.

However, joint enterprises of this nature have traditionally been viewed with caution because of their possible anti-competitive effects. Two cases, in particular, come to mind as examples of efforts at joint research that foundered on the rocks of antitrust citations. The first is U.S. v. Automobile Manufacturer's Association, a 1969 proceeding against GM, Ford, Chrysler, American Motors, and the industry trade organization, the Automobile Manufacturer's Association. The respondents had entered into a cooperative agreement for research on automotive exhaust pollution abatement devices, on the basis that reducing air pollution was in the public interest and that joint efforts in that direction would not be regarded as anti-competitive. The suit alleged that the joint agreement was, in fact, part of a conspiracy to slow down the development of anti-pollution devices. The case resulted in a consent decree, under which the participants agreed to return to their individual competitive efforts at developing anti-pollution devices with the hope, as expressed by the Justice Department, that the decree "will result in the industry moving at a speed of the fastest and most efficient producer rather than, as the case has been in the past, at the speed of the slowest."

A second suit, the outcome of which is still pending, is U.S. v. Manufacturers Aircraft Association (72 CIV 1307) filed in the Southern District of New York in March 1972. In this suit, every major American manufacturer of airframes is charged with engaging in illegal association to suppress competition in the research and development of aircraft. The suit also alleges that the companies agreed among themselves to license all of their patents to each other and not to obtain technology from anyone who was not a member of their organization, unless that outsider would agree to license the patents to all of those who participated in the agreement. The relief sought is dissolution of the association and that the member companies be forbidden, in the future, to enter into any agreements restricting research or have the effect of reducing competition in R&D through collusive patent policies.

These two cases represent the delicacy of any cooperative effort by industry to solve research and development problems jointly.

Moreover, Department of Justice spokesmen have expressed grave concern with balancing cooperative industry R&D efforts against the public welfare as represented by vigorous competition. For example, in a speech before the American Bar Association in the Spring of 1971, Mr. Kauper's predecessor, Richard McLaren, stated that he did not believe it to be necessary or desirable, in most cases, to permit companies in the same industry to work together in anti-pollution methods and devices. Mr. McLaren further stated that the antitrust laws are based on the assumption that "innovation is more likely to flourish through competitive efforts than by collective endeavors."

Nevertheless, Secretary Dent, believing that cooperative research might be a useful strategy among others to deal with our most pressing national needs in those areas of energy, materials, and pollution, where exceptionally high investments and risks are involved, requested the Commerce Technical Advisory Board (CTAB) to examine the antitrust aspects of joint and cooperative industrial research and development in the energy area. The Board, which is the principal source of external advice to the Secretary on matters involving science and technology, set out to determine and document industry's perception of the barriers to such joint ventures. The various industrial cases on our agenda today were uncovered by that CTAB study. As pointed out earlier, a major barrier is industry's perception of government antitrust policies. For this reason, the Board began its study in an effort to spell out, with the cooperation of the Justice Department's staff, current government policy in this area. This effort was also predicated on the desire to furnish concrete information to businessmen as to current antitrust enforcement policy and thus, hopefully, to permit early and decisive action in joint research and development projects.

As Bill Carey indicated earlier, the CTAB report concludes that with forethought and proper safeguards, research and development consortia can be designed and operated at low risk of antitrust challenge. In support of its conclusion, the Board identifies routes which reasonable business executives, acting in good faith and upon the government's urging, can take in responding to the need for R&D while minimizing the risk of adverse legal consequences. You should be cautioned, however, that although the CTAB report is a comprehensive study of the feasibility of joint research, it does not provide the institutional framework for carrying out joint ventures. The CTAB statement is largely a statement of principles, and there is a need to test these principles in the real world.

As a step in that direction, this seminar has been organized to provide an opportunity for dialogue between industry and government. We encourage interested companies to consider cooperative energy research and development efforts using the approaches suggested in the CTAB paper. In seeking favorable advice under the Justice Department's Business Review Procedure, these companies would be assisted by the Department of Commerce in designing a consortium that would be compatible with the antitrust laws. Once a pilot joint enterprise is successfully underway, we will have what we hope will be a blueprint for future joint research and development that will find favor with -- or at least not attract the disfavor of -- the antitrust enforcers.

It is our hope and expectation that some among you will propose a joint R&D effort. I recommend that in the early stages of your planning you notify the Secretary of Commerce in writing of your intention and include a brief description of the project. We will then select one or more of the proposals as models for a pilot effort and assign Department of Commerce personnel to work with you in developing an appropriately structured consortium that will meet the criteria for a favorable determination by the Department of Justice under its business review procedures.

From my remarks it should be clear that, in the view of CTAB and the Department of Commerce, it would be a mistake to assume that a consortium for research and development will in all instances automatically lead to antitrust complications. In fact, the probability is very high that cooperative research and development, if structured in the proper manner, will strengthen rather than retard competition and innovation in solving the technological problems which now pose a substantial threat to our economic and social well-being.

## GENERAL DISCUSSION: MORNING SESSION

DR. GOUSE: The program now provides us with the opportunity for questions on the various presentations and cases. I would encourage members of the audience to take this opportunity to ask questions.

Please identify yourself and to whom you direct the question.

MR. FUSFELD: Herb Fusfeld, Kennecott Copper.

There is one point that is a bit subtle that came up twice during the morning that I would like to comment on.

In Mr. Socolofsky's comment on the Mobil Oil presentation there was a comment that an exception was granted because it was in the overriding public interest and in Mr. Kauper's discussion he mentioned again the possible exception of whether research would not have been done if it were not for this joint venture.

On both these cases the subtle point creeping in is that there is an assumption that even though something is anticompetitive and would have been knocked out otherwise an exception can be made.

Now, I would like to just make one reference to this. Obviously we have a number of conflicting national objectives, antitrust is conflicting with other things we are doing in the international field in our effort for energy R&D and so on.

But I think the last thing in the world we want to do is to grant the Antitrust Division the right to make that exception.

I think we do in fact need a third party to weigh an anticompetitive action, if there is one, against another public interest. But I would hate to see an adversary in that case become the judge and that would be a very bad precedent.

DR. GOUSE: Who would you like to respond?

MR. FUSFELD: I would welcome comments from Mr. Kauper, I think.

MR. KAUPER: Let me challenge you simply if I might on the assumption.

I don't think that at any point did I mean to suggest that the Antitrust Division, if it concluded that conduct was anticompetitive, then had some overriding discretion under which we would say it can go ahead in any event.

The reference in my speech to the facilitation and research which might not otherwise be done I think should be put in a competitive kind of framework.

That is, if two firms are each perfectly capable of independently doing the research, the fact that they join together to do it may itself be a restraint upon that development.

On the other hand, and I think this is fairly standard joint venture kind of analysis, if it is the kind of project which simply would not be done otherwise, that mere fact of doing it jointly ought not be viewed as anticompetitive.

There is no restraint on anything which would otherwise exist.

Now, it may be that in that same project there would be other forms of restraints which we might find objectionable, exclusion of firms, various side agreements, that sort of thing.

I think in the statement made with respect to pollution which -- I think one has to keep in mind we are dealing with somewhat unusual case in that case history because we are dealing with a firm already under a consent decree, and the question simply was whether or not there was sufficient competitive injury that this ought not be approved.

I don't think it was put in terms of any overriding public interest but rather in terms of the competitive restraints, the purposes for which the decree was entered.

I am like you, I do not want to have any understanding that the Division has some authority under which it would say this is anticompetitive but to heck with it, it is in the public interest anyway.

I think that would be exceedingly unwise and it is a responsibility I would prefer not to have.

MR. WHITE: P. C. White, Standard Oil Company, Indiana.

Really a comment more on the observations of Mr. Swan on the work done on pollution control cooperation.

Much of the opposition that has been expressed to cooperation in R&D as being anticompetitive is I think based on the fact that historically industry has done its R&D to make a new product that it can sell or make a development process which it could make a new product more cheaply and sell at a greater profit.

So the incentive is to incorporate management in that situation very directly.

As a result, we have this tradition that individual R&D is very productive. It has brought us this tremendous economic progress we have made over the past 50 or more years.

Now, we have a situation where we are faced for the first time really with very intensive R&D challenges in the pollution field where there is not a product -- I am talking about industry which has a regulation to meet, not a company selling pollution devices.

So the undertaking of these massive research efforts is substantially less.

So there is a real danger in translating our experience in individual R&D and product and process work directly for the market to this pollution abatement field and feeling that there the anticompetitive effects of joint R&D would be anything like what they would be in the direct market.

I think there is a stronger case to be made in response to that for cooperation in this field and I think a case where we have to rethink objectives and perhaps application of the existing regulations in this field.

DR. GOUSE: Any other questions or comments?

MR. NEUHAUSER: Frank Neuhauser.

I have a question to Mr. Kauper. There are cases I believe which indicate that the antitrust effects or aspects of a joint commercial activity, particularly with the larger companies, may be reduced somewhat if the results of that activity are made available to competitors and particularly smaller competitors.

Would you expand possibly on the possible conflict between this consideration and the view you expressed that people perform better when they are not insulated from the reward of better performance or the penalties of nonparticipation in the sense that there would possibly be a tendency on the part of those outside this activity to just take a free ride because they feel they can also get the benefit and not suffer the penalty?

MR. KAUPER: Well, I think there is that risk. I think whenever you have a single consortium, for example, industry-wide, there may be the kind of problem which we found or the Division found in the smog and aircraft manufacturers case.

In essence by virtue of the manner in which technology was shared in that case it was concluded that the effect was to reduce everybody's incentive for all practical purposes.

The principle you refer to comes into play only in those circumstances where firms would be permitted to join together to do joint R&D or some other joint project. It is the principle of the old Associated Press Case which was not an R&D case at all, but assumes that if we permit firms to gain that sort of competitive advantage over others by virtue of joining together, there may be, in order to avoid further antitrust difficulties, some obligation to permit smaller firms to share in that particular result.

Now, as a practical matter in many cases, at least I am inclined to think and certainly in proposals that we have sanctioned, joint R&D does not mean that the entire industry has to be a member of a particular consortia.

There may be competing consortia. Access to one of those by smaller competitors may take care of their needs.

But there is, I suppose, way down at the end some difficulty in putting the Associated Press notion together with the idea of keeping incentives open to everybody.

Now, to some extent that can be done by the way in which the particular venture is structured, the payments which are to be made, the contributions which each firm is to make and so on.

That is, they need not simply be free riders coming along with neither a contribution nor any particular incentive, with nothing to be gained from their own contribution.

There are various ways to structure those arrangements to minimize that effect.

DR. GOUSE: Yes?

MR. SIEGEL: Irving Siegel, U.S. Department of Commerce.

I address this comment or question to both Messrs. Carey and Kauper.

Neither the CTAB Report nor Mr. Kauper's remarks nor any other contributions today has made any reference to the Small Business Act of 1958 which extended the 1953 Act, Section 9 which gave explicit provision and encouragement presumably to formation of cooperative R&D ventures to small business.

In view of the fact that 16 or so years have passed and the litigated cases are rather few, I am wondering whether there really is a potential in the whole concept of inter-R&D consortia?

MR. CAREY: I yield to my distinguished colleague.

MR. KAUPER: I don't really know the answer to that question.

I am certainly not here as a promoter of joint R&D, but I am simply here trying to discuss the various rules which might be applicable. Whether joint R&D holds the promise that some -- and I take it some speakers here this morning seem to have suggested -- I honestly do not know.

There has not been, as you point out, a great deal of this sort of activity in the past, for I suspect a whole variety of reasons.

I don't know how one can assess today whether this is going to add greatly to our abilities in the R&D field or not.

I just have no basis for making that judgment. Maybe some others up here, maybe they do, but I certainly don't.

DR. GOUSE: Mr. White?

MR. WHITE: I think I would answer that very definitely affirmative.

In the case I talk about this afternoon we have one. In the energy R&D we get into demonstration phases and we are facing $50 to $200 million expenditures, and I think you will see most of these where there are industry activities at all, whether with the Government or without, but a joint consortium of some sort.

One is being put together now by coal gas people and the coal gasification people.

There is one in gas recovery and several others are being talked about.

So I think that there is a place for them and I think they will be fairly common in the next five to ten years.

DR. GOUSE: Right here.

DR. JORDAN LEWIS: Jordan Lewis, Technology Incentives Program, Bureau of Standards.

My question, like most of the others, is directed to Mr. Kauper.

I think we distinguish clearly between two situations: one, the business firm is attempting to respond to signals from the marketplace which responses from most firms in the market certainly should be competitive to maintain a healthy economy.

The other situation is where a business firm is attempting to respond to social signals from the Government in which it is not clear that collectively responses violate the health of the market economy.

I think this is particularly true when society says we don't necessarily want the best technology but we want the solution, we want things to be better today. Especially manifest when an agency of the Government or Congress states such and such a solution shall be in hand by such and such a date.

I am wondering to what extent the antitrust activities of the Justice Department distinguish between competition for the sake of a healthy economy and competition in order to respond to a social signal.

MR. KAUPER: Well, I am not sure those are two totally divergent things.

I would have to agree with you there are obviously some kinds of R&D efforts which may directly manifest themselves in the marketplace and where you and I could sit here and immediately identify a marketplace incentive for individual research.

If you are going to sell a mousetrap and you can build a better mousetrap, presumably you have the incentive because of the sales you can make.

It is certainly true, we view competition as the best way of achieving that result. But what you have tried to do is to create a somewhat different category in which for some reason or other the marketplace itself is not going to pay off; that is, this is imposed and an individual firm cannot see the economic reward to it in terms of its own research.

Now, I think to say in that setting that competition is something different, to a degree misses the point.

It may be -- and that assumption may be right -- that there are no incentives and I suppose one could say that the restraint is of no particular competitive consequence.

But it seems to me we start with an assumption as we do in many areas that the best way to achieve a particular result is through competition.

Now, the very fact that firms may compete to reach a particular solution may still give you the best result.

The question is, I suppose, and I think this is really the question you are raising, not whether there is a difference in the value of competition, the question is one of incentive.

Do they have a particular incentive individually?

I think perhaps we might all agree or at least some of us would agree that given our historical bent, we would prefer to have the solution reached through multiple centers working towards the same result than otherwise if the incentive exists to do so.

In terms of incentives, the argument has been made that there are really none.

I am not totally satisfied that this is true. There are some cases where perhaps there is not. There are others where perhaps it seems to me there are, even when you have mandated a result. There is a certain incentive in not being the last to the starting line.

If someone else achieves the result and complies with the law and you don't, that aggravates your problems no end, I would suppose.

But I think that realistically we have to take into account that incentives are somewhat different in a given industry with a given project, and that the difference in incentives could lead to a different result.

It is not any preference in any particular way that we don't prefer competition. I suppose what it is saying is that we are not likely to get it.

DR. GOUSE: Yes? Question?

DR. WOLEK: Francis Wolek, University City Science Center.

We have done a study on consortia for the National Science Foundation.

My question is to Mr. Socolofsky.

You mention in your paper that there is full and complete publication of the results of the research that IIEC conducts.

The question here is what are the benefits of membership?

If your research is equally available through publication to General Motors and to Chrysler, why is Ford paying such a fee for participation in the firm?

MR. SOCOLOFSKY: I guess it is primarily a matter of timing. You know, as you conduct research you are learning first-hand and by the time you get it published it may be three months or eight months before a suitable forum like an SAE meeting comes along. So it is a time advantage and a detailed learning advantage by being a participating member.

DR. GOUSE: Right here.

MR. GRANT LEWIS: I am an attorney in New York City. I am Grant S. Lewis. The preceding question really highlights the balancing problem, we as attorneys would have in counseling between two competing policies.

On the one hand, I think you probably have companies agreeing to publish for the world, because of what Associated Press and those cases teach us, that if you do get together and create a real benefit in combination, you have got to make it available to competitors.

At the same time you have got the other problem, as a result of the aircraft manufacturers case, where you say, well, you don't have to make the benefit available, if that's going to destroy the incentive to develop the program to begin with.

Now, it's easy, in looking back, to say, "Yes, Associated Press was very important and, therefore, everyone had to get this," and, "Yes, after many years, the Aircraft Manufacturers' Association may have operated to impede innovation," but how, when we are planning a joint program, and when we are going to present it to you, do you have any factors that you feel bear on our balancings program?

In other words, whether we should open it to everyone and potentially destroy the incentive for people to innovate; or can we restrict the benefits and, therefore, be faced with the Associated Press problem.

MR. KAUPER: Well, I don't know that I can give you specific guidelines. I think, though, that one point would have to be kept in mind. The Associated Press idea, the idea that you must share with other competitors the results of your joint venture, more or less assumes that you are creating what, for all practical purposes, comes down to pretty close to being a monopoly-type joint venture.

In circumstances where you have, let us suppose, two non-dominant firms in an industry sharing their research, there surely is not obligation that that has to be shared with everybody. So, you confront this problem only in the circumstance where what you are trying to put together is basically an industry-wide sort of proposition.

Now, in trying, it seems to me, to establish that sort of a program, presumably on the assumption that this involves the kind of activity that cannot be done individually, I find that a lot of attorneys that I talk to on these matters have never considered the middle. The middle is, in essence, perhaps individual firms can't do it, but we don't need everybody in the industry to do it either; that a particular joint research enterprise may have to involve two firms out of maybe ten. Thus the opportunities which Associated Press talks about making available to others may be available through their ability to join in other consortia.

So I think you really have this problem only at the extreme, insofar as what the law requires.

I think, as I answered the other question, there is a dilemma at some point. I am not sure I can wholly answer it. It may come down to how you structure the particular arrangements within the consortium, the terms in which the information is available.

For example, do smaller firms which receive this information continue by virtue of the way in which programs they receive it, or what they have to pay for it, continue to have incentive to innovate on their own? Are they required, to put another question in, to put every piece of research which they do back into the consortia?

That may not be necessary at all under the Associated Press idea. It may be precisely that which creates your problem in the case like smog and aircraft manufacturers.

That was a rather long answer. I apologize.

DR. GOUSE: Any other questions?

MR. CRITELLI: I am Francis Critelli, Department of Commerce, in the Maritime Administration.

I think we are overlooking one possibility that derives its opportunity from the fact that joint research is not really joint research, it's jointly planned research and that the research need not be monopolized by any one of the participants.

Normally, there are two opportunities to do such research, one through a Government program, and the other through the industry program, such as we have been discussing today.

A third opportunity, to my mind, presents itself from the standpoint that consortia of industry groups might be utilized as the basic planning operation to identify the industry requirements, establish priorities and to outline, perhaps, a suggested program of collated research.

The implementation could then be done with some concerned Government organization by individual contract and cost sharing with results then disseminated to all.

I think that in doing this type of approach, the incentive is maintained for the individual participant, who performs his research on a co-op basis, and yet reserves as a reward for distributing the results to the industry, the results of similar, but different research performed by other co-op groups, and it would seem to me to be wholly within the disclosure laws and would permit action on the broad national front.

I wonder perhaps, if Mr. Kauper would comment on the antitrust aspects of such an approach?

MR. KAUPER: Well, I think to the degree that industry organizations or consortiums or whatever you call it, are involved in simply setting a blueprint for necessary research, and are not themselves directly involved in the manner in which that research is carried out, some of the antitrust objections, I suppose, are minimized.

Now, it may depend to some extent on just how specific you are being. That is, if the industry through its organization, whether it's actually a research consortium or trade association group, whatever, says, in essence, we as the industry have made a decision that only a specific type of research will go ahead, then I have a lot of problems. That is, if you get so specific that the recommendations for research really represent a collective judgment, setting aside other kinds of research by agreement, then I suppose, to a degree, you are into exactly the kind of difficulty that we have talked about before.

On the other hand, if it says, these are the areas we feel, given the technological development at the time, where research should proceed, we will bring together here in preparing these recommendations, the existing technology, as we know it around the world, what we perceive are the advantages of research into certain areas, that seems to pose no major antitrust problem.

DR. GOUSE: Question up here?

MR. JOGLEKAR: I am Prafulla Joglekar. I am with the University City Science Center, working with Dr. Wolek on the NSF Project.

We have investigated a number of consortia and we are given against the consortia the need for completion. The number of arguments that I have heard from was that this combination has to be defined as to what level. Most of the people are here talking about competition. Even if that is reduced, then there may be inter-industry competition and international competition. I think that would take care of the incentive for conducting research in this area, even if the industry gets together.

DR. GOUSE: For whom is your comment directed?

MR. JOGLEKAR: Mr. Kauper.

DR. GOUSE: You are very popular.

MR. KAUPER. I think, in assessing any arrangement, whether it be a joint research consortium or some other kind of conduct, other than that which we would view as a per se offense, such as price fixing, we obviously have to make judgments about the effect of the particular conduct on competition and on the marketplace.

Now if in fact there is another technology which is in a sense directly competitive, although in terms of the final product, we might say it doesn't look alike, it's got some kind of different qualities, but if, in fact, it's competitive, then I assume we have to take that factor into account in the judgment that we may make.

Now, to a degree, I suppose, that is also true internationally, although what you are coming close to is, how we define a competitive market, and who is in it, and who is not in it. The Department has always, and I think quite justifiably, been rather skeptical about defining markets in international terms, largely because there still remains a great many artificial barriers and barriers which do not exist today may well exist tomorrow.

One may look at a given industry and say, "Yes, there is no significant duty barrier today." But when the industry gets itself in trouble, it comes down and pleads with the Congress or somebody else, and tomorrow there is a duty.

Well, they will probably have told us the day before that their goods are freely competitive on a price basis with goods from abroad, and tomorrow they are taking steps to assure that that's no longer the case.

So we do have a certain skepticism about viewing this in world market terms.

Now, that may be true as to products, and it may not be true as to research and technology.

That is, research in the abstract may, I suppose, be an international commodity, if you like, and perhaps in some circumstances we may have to view that somewhat differently.

DR. GOUSE: Yes?

QUESTION: What I find most strikingly different between the U.S. Government policy and European policy is that there, the government is going all the way out to promote cooperative leases, and here we see the Government more as a constraining force.

I do find it strikingly different in that respect.

MR. KAUPER: I think that characterization is probably true, as it's true not only on R&D but a great many other matters.

Again, you can find developed countries elsewhere that have a policy strongly encouraging corporate mergers. We do not.

I am always a little wary of those arguments, because at some point it always suggests to me that someone has reached the conclusion that, because the rules are different, we should follow theirs.

I am never sure why that should be the case, because it seems to me, before we simply make that comparison and say, "Well, they are different than we are and, therefore, we ought to have their rules," somebody ought to decide that their rules are better than ours.

I am not really sure anyone has made that judgment.

DR. GOUSE: Over here.

MR. McEVOY: I am James McEvoy, with Air Products & Chemicals, Inc. I have a question regarding the utility of R&D consortia that I would like to address to Mr. Socolofsky.

First of all, in reference to the IIEC effort, do you think this cooperative effort was useful? I might say, I mean useful in advancement in state of the art? Did the members achieve any advantageous commercial position from this cooperative effort?

I have another question somewhat related, and that is how did you handle results which must have come out of this program, as far as assigning rights and so on?

MR. SOCOLOFSKY: Well, Mr. McEvoy, I think it's obvious that we have found it useful by the fact that the program has been continued well beyond the original goals in technology and money.

I don't know that there has been much competitive advantage out of it, except for the know how that -- speaking for Mobil now -- that our company has gotten on, not only the feasibility of meeting the emission standards, but also the trade-offs in fuels and engine design technology that may be used to achieve those standards.

I called it a joint research project, and one of the gentlemen in the back, I think, made a good distinction that it was really joint planning of the total emissions research effort. The execution was actually done by assigning projects to individual companies.

For example, AMOCO research did virtually all of the nitrogen oxide reduction catalyst development.

Mobil worked on oxidation catalysts for hydrocarbons and CO.

Some of the Japanese companies were assigned the projects concerning thermal reactor development.

Ford Motor worked on carburization, feedback controls, and so forth.

So, the execution was done by individual companies with planning and discussion of results being joint research results.

Regarding the question on assigning rights to IIEC. Yes, there were a number of patents. They were assigned to the specific companies that generated the patentable ideas and then licensed royalty free to the other participants.

DR. GOUSE: Yes.

MR. BOSCO: I am Joseph Bosco, attorney here in Washington.

I have a question of Mr. Socolofksy. You described in some detail how the Government's antitrust laws were an inhibiting factor to the success of your program. Could you comment particularly as applied to energy R&D, as to effect of our Government policies which was imposed on you? Namely, higher standards? Did that attempt to spur on cooperative efforts, or did that have a damaging effect?

MR. SOCOLOFSKY: I am afraid it was more a frustrating experience at the time. We had set standards that we felt were far beyond what were needed, just to set a difficult goal which, as it was met, and as it would be applied to vehicles produced, would clean up our environment back to the 1940 levels, which were judged to be quite good.

So that it was quite a shock to suddenly have imposed almost unrealistic standards, and I guess that the decision was to go ahead and continue to try to meet them, but there had to be delays and so on in implementation.

Now, what was the other specific part of your question?

MR. BOSCO: I think you have answered the question. Thank you.

DR. GOUSE: Last question?

MR. THORNTON: I am Charles Thornton, AEC.

I wondered if anyone on the panel or the group would comment on the role of the nonprofits, particularly those in R&D for fee, the trade associations which we are now seeing, such as the EPRI; and the Government itself, as a member of the consortia?

This is particularly one of Dr. Gouse's problems, too, I think where we are trying to bring in what amount to national laboratories into these consortia, where we are trying to get shared costs and in some cases, of course, the incentives, such as market price guarantees longer term.

The Government has the role to provide new energy options, but clearly many of these are not going to be undertaken by industry alone, nor a consortia.

We have all these national non-profit trade associations, Government and finally the corporation itself attempting to do the job, and much technology that would be developed may be internationally publishable and this provides another disincentive in the sense that the private industry does not like to see its technology essentially disclosed internationally.

These factors, I wonder if any of you would comment on at this time?

DR. GOUSE: Any takers?

MR. CAREY: Well, I will comment.

Almost every group that I get involved in these days in my charity practice, so to speak, with Government advisory groups dealing with technology, I hear great foreboding in Government circles about the export of American know-how. I am not sure that engaging some of these more or less third party types of organizations in the work of innovation particularly, deals with the issue of giving away the technology on top of all that is already moved out and into other parts of the world to the apparent detriment of our economy.

I think as far as the institutional questions are concerned, the CTAB paper, in effect, provides this, you provided other alternatives. You begin to involve parties of public interest character which, indeed, may make some contributions toward diminishing the antitrust concerns of joint effort.

DR. GOUSE: I think we'll close it for the morning session and recess until 2 o'clock.

I would like to thank the members of the panel and the audience for all their contributions.

(Whereupon, at 12:30 p.m., the meeting was recessed, to reconvene at 2 p.m., this same day.)

## OPENING OF AFTERNOON SESSION

DONALD W. COLLIER
Vice President - Research
Borg-Warner Corporation
(Past President, IRI)

In introducing our session this afternoon, we are going to discuss two other constraints to cooperative work. As Under Secretary Tabor said this morning, we have challenges facing us in technology, in institutions, and in political will.

I believe that if we are really going to make Project Independence work, all of these areas have got to be addressed with an above and beyond the normal call of duty in response to those challenges.

This morning's session was concerned with antitrust. The problem we faced, from an industrial standpoint, was as company employees we were concerned with having to carry out our function, with due regard for the public and the laws of our country.

For this afternoon's session, from an industry standpoint, we have the other side of the coin. Acting as public-spirited citizens, knowing we have to cooperate with the Government if Project Independence is going to be a success, how can we best do it and still meet the responsibilities that we have to our own companies and to the people that are supplying capital to those companies?

Our first speaker this afternoon will discuss one of those constraints and the dilemma that it poses in his talk about the Government patent policy. He is Jason Salsbury, who is the director of chemical research for the American Cyanamid Company. Dr. Salsbury has spent his entire career with the American Cyanamid Company and therefore, knows its problems intimately. He is also associated with IRI, being on its Board of Directors.

Our next speaker hardly needs any introduction. In addition to being Assistant Secretary of Commerce for Science and Technology and Chairman of the Government Patent Policy Committee, which eminently qualifies her to talk on this subject, Betsy Ancker-Johnson is also a graduate of industry, having had service with both the Boeing Company and the RCA Company, so she is in an excellent position to see all sides of the question.

Our next industrial speaker is Dr. Philip C. White, General Manager of Research for the Standard Oil Company of Indiana. Dr. White is a true Midwesterner, having had his entire education at the University of Chicago and his entire business career with the Standard Oil Company. So we should expect some rugged individualism in his talk, I believe. Phil is a past president of the IRI and is particularly appropriate to this session, since he was the first chairman of IRI's expanded activity to work more closely with the Government through its Federal Science and Technology Committee. Dr. White will speak on Government delays as a deterrent for cooperative work between industry and the Government.

Our concluding speaker of the afternoon is the new Administrator Designee for the Energy Research and Development Administration. He is going to be leading the charge, for the research and development necessary to underly Project Independence. Bob Seamans comes to us with a very well-rounded background having been in Government, industry, and academia in various parts of his career. He has, as you all know, most recently been President of the National Academy of Engineering. Prior to that he was a Secretary of the Air Force. And prior to that, Deputy Administrator of NASA. He has had experience with the RCA Company and he has been a professor at MIT. I am sure we all look forward with great interest to the remarks of Robert Seamans, on the subject of making our country strong as possible in the energy field.

# GOVERNMENT PATENT POLICY AS A DETERRENT TO COOPERATIVE R&D

JASON M. SALSBURY
Director
Chemical Research
American Cyanamid Company

Thank you for this opportunity to present American Cyanamid Company views on Project Independence.

When the project was announced, I was asked to recommend whether and how Cyanamid could participate.

We have a long history of assisting in major Government research programs. Further, we feel we have both the technology and the scientists capable of making valuable contributions to such a program.

However, I was forced to recommend in mid-1974 that Cyanamid should NOT participate in Project Independence due to the restrictive patent policies in the congressional legislation being considered at that time.

However, I also advised a review of this action if the restrictive patent policies were relaxed.

I was asked by Dr. Don Collier to tell you what we could have done and why we decided we could not join in Project Independence.

Our study was two-pronged: (1) What contributions we could make, and (2) What effect our participation would have on our corporate position.

We started our review favorably inclined to be a part of Project Independence. We were in agreement with its goal even though we thought the 1980 timetable was probably too ambitious.

We have participated in such efforts before. In the early 1960's our Government-sponsored contracts were at the level of about $1.5MM annually. Our contracts have been less in the recent past. These contracts involved fuel cell electrodes, a catalytic air purifier, zinc/air batteries, solid rocket propellant ingredients, high energy compounds, chemical lighting systems, infrared absorbing chemicals, UV stabilizers, photochromism, laser protection and use of enzymes. All these involved energy conversions.

Cyanamid and the Government have found these associations mutually beneficial.

Cyanamid is a major supplier of supported catalysts, primarily to the petroleum industry. We have trained and experienced scientists in this technology. In the past 20 years we have developed and accumulated considerable knowledge in the preparation of catalyst supports and impregnation of the supports with active promoters. We have been granted many patents in this field. We know how to evaluate catalysts for (1) activity, (2) life, and (3) the required mechanical properties. We further have learned how to extrapolate this data to effectiveness under commercial conditions.

To be specific, we can make a valuable contribution to the conversion of coal to gas or oil through our catalyst know-how. When coal is converted to high BTU synthetic natural gas, it is oxidized to $CO_2$ and $H_2O$. If high sulfur coal is used, the gases may be desulfurized with HDS catalysts such as we make. The $CO_2$ and $H_2O$ gas is shifted catalytically to CO and $H_2$. This mixture is then converted to high BTU methane, again using catalysts.

Although catalysts are available for each reaction, they require improvement. We can develop methanation catalysts with high temperature stability and sulfur tolerance so that higher reaction temperatures can be used and the catalysts will be less readily poisoned.

We can also develop shift conversion catalysts with low temperature activity and improved sulfur tolerance.

These improvements may also be combined into a single catalyst combining the shift and methanation steps as was done recently by ICI.

Another example is in the field of shale oil recovery, where Cyanamid research has already developed ceramic balls for the retorting process. We consider these superior to other products currently available for this use. Shale oil requires specific catalysts, especially denitrification catalysts, in the refining process. We can develop the required catalysts. We believe a joint research effort with a specific shale oil developer is the best way to overcome the problems in the conversion of shale oil to commercial products; since the oil from each deposit requires specific catalysts.

For coal liquidification, Cyanamid can develop catalysts for treatment of the liquid produced by the hydrogen donor process. We believe this would be a relatively straightforward project for us. Again, a joint research effort with a process developer is the best way, in our opinion, to insure success.

About 70 percent of the oil in a deposit is not recovered when production from a well becomes uneconomic. Use of surfactants and water soluble polymers often permit the economic recovery of about half of the remaining oil. This would appreciably boost U.S. production. Cyanamid is one of the world's largest producers of acrylamide and polymers of acrylamide. These polymers are water-soluble and their very dilute aqueous solutions have high viscosity. Such solutions are finding increasing use in tertiary recovery of oil. We are already active in this area developing new acrylamide copolymers to meet the requirements of specific petroleum companies.

There is, therefore, no question that Cyanamid can contribute to Project Independence. We have technology and scientists experienced in important areas.

The next question is, can Cyanamid participate? Unfortunately, the answer to this question is not as favorable, because of the effect of patent policies.

The patent policy of the U.S. Government is defined in broad terms by the presidential memorandum of August 23, 1971. This statement provides a flexible approach which makes it possible for the contractor, under some circumstances, to acquire greater rights than a non-exclusive license, at the time of contracting. This is certainly a desirable policy since it encourages contractors to participate in Government-funded research programs.

The regulations of such agencies as NASA and the Department of Defense essentially follow the same policy.

The early efforts in structuring patent policy with respect to energy legislation departed considerably from the favorable policy of these precedents.

The original drafts of energy legislation, preceding H.R. 13565, provided exclusive title to the Government, and required, as a condition of participation, that a contractor's background patents be available "to any qualified applicant upon a finding by the Administration that the background technology is necessary to achieve commercial application of the energy process." This provision jeopardizes our extensive corporate patent position in the catalyst and polyacrylamide areas. This is counter-productive and will deter potential contractors from joining the energy program. It caused me to recommend against our participation in the program.

Fortunately, this provision has been deleted in the version of H.R. 13565 which has passed the House. A better amendment, Section 7, which is specific to patent policy, is now included in the bill. It permits the Administrator to "waive all or any part of the rights of the U.S. with respect to any invention" if he "determines that the interests of the U.S. will be served thereby."

Section 7 properly provides the ERDA Administrator with the necessary flexibility to deal with inventions, patent rights falling therefrom, and licenses.

Additionally, it will permit him to properly consider and handle related know-how and proprietary information in such a manner as to encourage participation by those having the necessary skills and experience to solve the problems faced in the energy program.

This Section, 7, represents a reasonable approach to the problem of establishing patent policy in federally sponsored energy research and development programs and should provide the necessary flexibility to encourage the participation of private industry in such programs.

Section 113 of S.1283, in its original structure, the counterpart of H.R. 13565, provides that the Federal Government may require anyone, including a non-participant in joint Government/industry research projects, to license his patent covering energy-related technology, if the ERDA considers this action "is reasonably necessary to the development or administration of an energy system."

Such provision authorizing compulsory licensing of third-party patents is particularly objectionable and we believe will adversely affect the potential of the U.S. to develop energy technology. The net effect of this provision is to force non-interested, non-contracting third parties to provide a license through their patents. Such patents are normally acquired by patentee at his own expense, in many cases after years of research expenditures and are deserving of proper return on research investment.

Although Section 113 provided for court review and states a license shall be available on "reasonable and non-discriminatory license terms," such terms will be, in many instances, inadequate recognition or compensation for the acquired rights. This represents a direct and unnecessary invasion of exclusive rights normally provided a patentee.

We believe such provisions are inflexible, burdensome and do not answer one of the principal purposes of the legislation, namely, to encourage private industry to undertake energy research and development projects.

After this paper was written, the Senate-House Committee recommended a modified and liberalized patent policy. The new proposal permits the Administrator to "waive all or any part of the rights of the United States...if he determines that the interest of the United States and the general public will best be served by such a waiver."

It also directs the Administrator of the ERDA to report to the President and the Congress within 12 months on the applicability of existing patent policy affecting the program. The Administrator is directed to recommend amendments to statutory policy which he deems advisable.

The mandatory licensing section of S.1283 has also been eliminated.

These revisions are much more reasonable and we can live with them. If the law that finally passes embodies these improvements, I would seriously reconsider my recommendation concerning participation in Project Independence.

There is also legitimate concern about obtaining sufficient personnel to undertake Government research. As a result of previous reductions in our research staff, all our scientists are engaged in high priority commercial research projects.

The technological know-how we have as a company resides with senior scientific research members and we would have no alternative but to put the best and most experienced of them to work in the energy area, if we engaged in a research contract. Replacements for them would have to be hired. This would weaken our ability to continue important research projects presently underway in areas which are commercially important.

In conclusion, as one of the major corporations in the U.S., we already possess the technological resources to help strive for the goals of Project Independence. Cyanamid is eager to participate, but not to the detriment of the employees and stockholders who have helped build our technological base. Government contracts must be made at least as attractive as regular industrial research with which it competes.

# ON THE HORIZON: A NEW GOVERNMENT PATENT POLICY FOR NON-NUCLEAR ENERGY RESEARCH AND DEVELOPMENT

BETSY ANCKER-JOHNSON
Assistant Secretary of Commerce
for
Science and Technology

Dr. Salsbury has given us a most informative history of the ERDA patent policy provision. I especially appreciate his candid assessment of the discouraging effect which earlier versions of this provision would have had on American Cyanamide's participation in Project Independence.

My task this afternoon is to highlight the principal features of the patent policy section as it now appears in S. 1283, the Nonnuclear Energy Research & Development Bill. I am informed that S. 1283 passed the House on a voice vote less than fifteen minutes ago. There was no debate on the patent policy provision.

The text of the patent provision in S. 1283, as reported out of the Conference Committee last Wednesday, remains unchanged from that which was negotiated between Senator Hart and the Administration. Inasmuch as my office represented the Administration throughout these negotiations, I am aware not only of the strong points of the present provision, but also, and perhaps more acutely, of its weaknesses.

To the extent that we had any bargaining power at all in our confrontation with Senator Hart, the entire credit must be given to Congressman Don Fuqua, a Florida Democrat and a member of the House Science and Astronautics Committee. It was he who led the successful floor fight last September which resulted in the deletion of the patent policy section that had emerged from the House Interior and Insular Affairs Committee.

Congressman Fuqua announced that he would lead yet another floor fight if the House Conferees brought back a package which did not accord with those principles which I, as spokesman for the scientific community and the Administration, had enunciated in my testimony before the Interior Committee. It was the fear of this second floor fight, potentially jeopardizing the whole of S. 1283, which brought the Senate to the conference table.

What, then, did we bring away from the table?

We have, essentially, a title policy. The major tenet of this policy may be expressed as follows:

> THE GOVERNMENT WILL TAKE TITLE TO ANY PATENTABLE INVENTION WHICH IS CONCEIVED OR FIRST ACTUALLY REDUCED TO PRACTICE IN THE COURSE OF OR UNDER ANY ERDA R&D CONTRACT.

So far as government-financed inventions are concerned, the Senate would have inserted a period at the end of this sentence.

I am confident that many of the firms represented here today hold patents on inventions which have never been "actually reduced to practice." Remember, the mere filing of a patent application on the concept is not an "actual" but rather a "constructive" reduction to practice. Patents which fall into this category can be lost to the government if the first actual reduction to practice occurs under a contract between the patent owner and ERDA. There are two ways to protect your patent rights in this situation. You can refuse to enter into a contract with the government... ...or you can achieve the first actual reduction to practice at your own expense outside the contract. The difficulty which exists here is no different from that which you face under NASA and AEC contracts today.

Now I recognize that the establishment of a title policy for ERDA constitutes a dismal beginning. You will be happy to know, therefore, that there are exceptions to this policy. The principal exception may be stated as follows:

> THE ADMINISTRATOR MAY WAIVE TITLE TO ANY INVENTION, EITHER AT THE TIME OF CONTRACTING OR AFTERWARD, PROVIDED THAT CERTAIN CONSIDERATIONS ARE SATISFIED, AND PROVIDED FURTHER THAT THE GOVERNMENT RETAINS A LICENSE FOR ITS OWN USE, AS WELL AS CERTAIN MARCH-IN RIGHTS.

The first step in getting a waiver is to ask for it, either at the time of contracting or after the invention is made.

The next requirement is that the Administrator sit down and reflect on a number of considerations which the Congress feels should be in the forefront of his mind whenever he makes a waiver decision. More on these considerations in a moment.

It is important to note that there is no hearing connected with a waiver determination. Nor is there any provision for third party participation. And finally, there is no court review of the Administrator's determination.

Now since it is easy enough to ask for a waiver, the important question is whether it will be granted. What exactly are these considerations on which the Administrator must fix his attention? The number of considerations involved is 11 in the case of waivers requested at the time of contracting, and 10 for waivers requested after identification of the invention. Eight of these considerations are the same in each case, and they may be paraphrased as follows:

1. Government's contribution to the field of technology
2. Intended use of contract results
3. Contractor's contribution to the contract, either of money or technology
4. Contractor's contribution to the field of technology
5. Government's intentions regarding further development
6. Public health, safety, and welfare needs
7. Effect on competition and market concentration
8. Technology transfer capability of any university applicant

Focusing on consideration #5, as a for instance, the government would not want to waive title to an invention which it intended to carry all the way through the development process and into the marketplace - such as was done by Agriculture in respect to instant mashed potatoes.

In addition to these eight basic considerations, there are three others which must be attended to when the waiver is requested at the time of contracting .

- Is the contractor's participation necessary?

- Will the contractor's participation expedite attainment of program objectives?

- And, finally, will the contractor's commercial position expedite utilization of the R&D results?

We have two different questions to ask if the waiver is requested after identification of the invention.

- First, do we need a waiver to call forth risk capital?

- And second, will the granting of a waiver really help speed this technology into the marketplace?

Let's suppose that, after applying the appropriate considerations, the government decides to retain title; what happens then? As a general proposition, the contractor responsible for the invention will receive a non-exclusive license in the U.S. and full foreign rights in any country where the Administration itself does not seek a patent. Additionally, the Administrator can grant non-exclusive licenses to other parties in the U.S.

In fact, there are many in the Congress, particularly in the Senate, who feel that the best way to commercialize an invention is to insure that as many people as possible have the right to practice that invention.

Our experience in this matter suggests that the opposite is true. Of the 23,401 government-owned U.S. patents available for licensing during fiscal year 1972, only 1,238, or less than 6 percent, were actually licensed. Moreover, the overwhelming majority of those patents which were licensed had only one licensee.

It was for the purpose of correcting this anomaly that we insisted upon the flexibility to license exclusively in appropriate circumstances. The only requirement is that objectors be afforded an opportunity to be heard before an exclusive license is granted.

While I hate to be the bearer of ill-tidings, especially when things are just now beginning to look reasonable, I must remind you that we negotiated this settlement - we didn't write it. We didn't get *waiver of title without hearing* and *exclusive licensing* just by asking. We bargained for these features and we did so in good faith.

We took the position that it made better sense to relax the antitrust controls at the beginning of the administrative process, while applying a second look further down the line.

Instead of holding up a hundred waivers because one of them might be ill-advised, why not waive more generously in the beginning and call back the one, if any, *after* it becomes distinguishable from the 99?

Accordingly, we accepted all of the standard march-in rights, plus an important new one. This new march-in right permits the Administrator to modify or rescind any waiver which can be shown to have transgressed the antitrust standard set forth in Section 7 of the Clayton Act, notwithstanding the fact that suit could not be brought under that statute because of governmental participation in the questioned activity.

Section 7 of the Clayton Act deals not only with mergers but also with the acquisition of capital assets. A patent is a capital asset.

Suppose that, instead of acquiring the patent on a waiver from the government, you purchased it from a private party. Should that purchase be set aside as a violation of Section 7 of the Clayton Act? That is the question which the Administrator may be asked to decide. If he answers yes, he can rescind the original waiver, or require you to license the patent to other parties, with or without royalties.

However, you are entitled to a hearing before your waiver can be modified or revoked, and the hearing cannot be called until four years following the patent filing date. This protection is inserted to curb unnecessary fears respecting the invocation of this Section. We know of no existing waiver which could be recalled under this clause. We doubt that one will ever arise.

In summary, these are the highlights of the ERDA patent policy.

- It is a title policy, as distinguished from a license policy.
- However, the Administrator can waiver title and he is encouraged to do so when such is in the best interests of the United States.
- The Administrator has the option to grant exclusvie licenses.
- There is no mandatory or compulsory licensing of privately-owned patents - such as called for in the original Senate version.
- And finally, there is no surrender of background patent rights as a precondition of participation in a government contract. This precondition was also contained in the original Senate version.

I am hopeful that the settlement which we reached with the Senate will permit the full force of our private inventive capacity to be brought to bear in the successful implementation of Project Independence. We have certainly come a long way from the draft provisions which existed last September. The crucial question is whether we have come far enough.

# # # # #

# INDUSTRY-GOVERNMENT COOPERATION ON THE H-COAL PROJECT - A CASE STUDY

PHILIP C. WHITE
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Chicago, Ill.

The case history I am to discuss this afternoon is listed in the program as representing an Industry viewpoint on "Government Delays as a Deterrent". Optimistically, I note that unlike the earlier case histories presented, there are no Government rebuttal speakers listed. Thus, I hope we can safely conclude that no one is really in favor of delays as a deterrent. Be that as it may, however, I would like to emphasize, at this point, some strong feelings I have concerning this meeting and the subject we are discussing: First, success in finding ways that work to carry out cooperative R&D is absolutely vital, not only to current projects, but to our Nation's economy and future well-being. All of us have great incentives and a heavy responsibility to give top priority to those actions which will bring the needed new technology to the public use. I shall elaborate further on this later on. Second, since the constraints we face involve primarily "people problems", success will not be attained easily nor quickly. But meetings like this one, and any other ways we can think of to improve lines of communication and build mutual understanding and respect for each other's viewpoint, can be a big help. I'm sure today will be a step along this road. Thus, I hope you will judge what I say today about the H-Coal case history with the thought in mind that it is presented as an example of the types of steps we might take to clear away some of the obstacles to Government-industry cooperation.

The technological object of my case history is the "H-Coal process" for converting coal into either a synthetic crude oil or a heavy liquid fuel. It has been under development since 1962 by Hydrocarbon Research Incorporated (HRI), a subsidiary of Dynalectron Corporation. It is an outgrowth of the technology and patent position they developed earlier for the H-Oil process which has now been in commercial use for over ten years. Both are based on catalytic hydrogenation utilizing an ebullated-bed reactor. The latter is a novel design which provides continuous movement and close contact between catalyst and reactants. As a means for converting coal to liquids and removing ash and sulfur, H-Coal is one of six currently promising processes for eventual commercialization.

SL 1 The H-Coal project did not become what one could term a "Government-industry case history" until early 1973. However, there is a ten-year history prior to that which I will review briefly, as it is pertinent to full appreciation

SLIDE 1

## CHRONOLOGY OF H-COAL PROCESS DEVELOPMENT

| | Sponsorship | Expenditures |
|---|---|---|
| 1962 - 1965 | HRI | $ 500 M |
| Feb. 1965 - Sept. 1967 | Govt. (OCR) | $1,700 M |
| Sept. 1967 - Jan. 1968 | HRI | $ 250 M |
| 1968 - 1973 | HRI, plus ARCO, SUN, ASHLAND, EXXON & STD. OF INDIANA | $6,500 M |

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of the later developments. HRI initiated research under their own sponsorship in 1962, spending about $500,000 over the next three years. This bench-scale effort was essentially aimed at applying, to coal liquefaction, the ebullated-bed hydrogenation technique they had previously developed for heavy oil upgrading. This was an effort on which they had spent $10 million over the previous eight years. By 1965 the process was showing sufficient promise to attract the sponsorship of the Office of Coal Research for further development and pilot-scale demonstration. The OCR contract was for 100% sponsorship and resulted in an expenditure of $1.7 million over the next 2½ years. In September 1967, this contract was terminated because of an OCR budgetary limitation, despite excellent progress and a favorable technological outlook. HRI continued research under their own sponsorship for several months, committing about $1/4 million in funds. During 1968 oil industry sponsors started becoming interested in the project, and additional funds were committed. Arco and Sun Oil were the earliest sponsors, with Ashland, Exxon, and my Company, Indiana Standard, joining in later. During the period 1968 through 1973, a total of $6.5 million was spent by these private sponsors plus HRI.

Progress on the project during this 12-year period was uneven since it was, naturally, tied to availability of funds. However, despite the comings and goings of sponsors and the obvious lack of prospects for near-term economic gain, it did survive and progress at a modest overall rate. The fact that it was able, during the later years, to attract private sponsors testifies to HRI's accomplishments. Also, as a direct outgrowth of this project, there are now 24 domestic H-Coal patents held by HRI and/or sponsors. Three of these were issued jointly to HRI and OCR during the 1965-67 period.

In the later stages of this period, 1972 and early 1973, increased emphasis (and money) was put on operation of a 3 ton/day process development unit (PDU) to prove-out process features and equipment performance, and to evaluate the economics. The latter indicated that synthetic crude could be produced for $6 to $6.50/bbl at then current costs. This, of course, aroused no great enthusiasm as it was a long way from being competitive with petroleum crude oil. However, with all projections of crude oil supply and demand showing an impending shortage, the Office of Coal Research agreed to consider a proposal for an H-Coal pilot plant. HRI prepared same, and here is where our case study can begin.

SL 2 In January 1973, HRI approached the OCR to determine their possible interest in sponsoring a project for a full-scale 600 tons/day pilot plant utilizing the H-Coal process. After some negotiation and agreement on guidelines, OCR told HRI to begin preparation of a proposal as they were interested. HRI responded with a complete package proposal including all phases of the design, construction, and operation, under which HRI was to be manager and have full responsibility for all phases. This proposal was submitted to OCR in June 1973, after several thousand man-hours of preparation time. During this six-month period, patent policy guidelines were issued by the

SLIDE 2

## H-COAL EVENTS OF 1973

| | |
|---|---|
| JANUARY | - Basis for proposal bid developed by HRI and OCR |
| APRIL | - USDI Solicitor's Office established guidelines on patent policy |
| JUNE | - HRI submitted proposal |
| SEPTEMBER | - Private sponsor arrangements and work scope negotiations |
| NOVEMBER | - OCR submitted contract draft |

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U.S. Department of Interior Solicitors Office regarding the background patent position of HRI. By September 1973, OCR had reviewed the proposal and negotiations were begun on two major areas to be resolved: One, the extent of private-industry funding, and the other the scope of the work program. The former was resolved by adjustments in language, making it consistent with the proposed 2/3 Government and 1/3 private funding. The work program was not resolved at this point and remains, even now, a potential bone of contention.

These negotiations led to a contract draft submitted by OCR to HRI in November 1973. This draft contained the background patent provisions as earlier advised by USDI. At this point, about ten months had elapsed and reasonably good progress had been made. Especially considering that the undertaking was immense: an $80 million three-phase project was defined, planned, and cooperative funding provided for, and also that this was the largest contract OCR had even undertaken.

SL3 The next two months, December and January, were spent in fee negotiations and in mid-January, OCR announced that negotiations would have to be reopened on the background patents and foreign patent rights. These negotiations failed and ended with OCR announcing that all HRI background patents must be available "royalty-free" for undefined Government end use. This provision was, of course, quite unacceptable to HRI since it could nullify much of the value of their earlier inventions. However, at this point, other than back out completely, HRI's only recourse was to request an administrative review. This was done and the contract was "signed-off" by both parties and sent to Interior's "Survey and Review" division on February 1, 1974. Thus, it took a full year from initiation of the proposal to signing of contract. This is somewhat long, by industry standards, considering that preparation of the proposal took only five months; however, it would still not be a bad track record if that had finalized things. However, that was not to be, as we shall see.

I should interject here a note concerning the industry sponsors. Having made their proposal on the assumption of industry funding up to 1/3, or $27 million, HRI now had the challenge of convincing the five companies to continue, or alternatively, others to join. Despite the uncertainties, the lack of involvement by the sponsors during the OCR negotiation period, and the less than completely satisfactory terms, Ashland, Standard of Indiana, and Arco stayed in as participants, and Sun Oil and EPRI have joined in 1974, the latter on a contributor basis rather than as a participant. Speaking for at least one of them, we feel frustrated, but hopeful.

Getting back now to our time-table of events: in February 1974, right after the contract was submitted to "Survey and Review", an administrative change took place which gave approval authority to the USDI Office of Management Services. The result of this was a basic rule change which could not have come at a worse time for the H-Coal project. Thus, after informally announcing in early March that the contract was approved, OCR a few days later had to call in HRI and announce that the contract had to

SLIDE 3

## H-COAL EVENTS OF 1974

| | |
|---|---|
| JANUARY | - Patent policy change by OCR |
| FEBRUARY | - Proposal sent to "Survey & Review" |
| MARCH | - Proposal disapproved, must be redrawn |
| MAY | - Letter of intent to keep HRI working on project |
| SEPTEMBER | - Phase I contract signed |
| NOVEMBER | - Roster of private sponsors filled. Site and operator selected. |

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be redrawn on an entirely different basis. It had to be separated into three phases: I-experimental and design, II-construction, and III-operation. Each phase then had to be let out for competitive bids. Needless to say, this development was a severe blow to the project, both in terms of time and effort lost, and in mutual confidence in our ability to work with the Government as a partner. It would have been preferable, in retrospect, if the Government had shown sufficient flexibility to permit a contract, negotiated under one set of rules, to be honored even though it was at variance with revised ones. There perhaps is more to the story of this project setback than is known to me, as an industry-side observer. Even if so, it is critically important that the basis for negotiations be clearly understood by all participants early in the game. Hopefully, our session here today, and other such mechanisms, will help in bringing this about.

In addition, as a part of the March 1974 setback, the experimental work program of Phase I was also revised by OCR. In the new program, the PDU performance requirements were made extremely stringent and the ability to meet them was made a condition of OCR's continued sponsorship into Phases II and III. Perhaps this appears to be just good bargaining practices at work, but the timing and manner in which it was done just resulted in further delays and deterioration in confidence. The stringent requirements were set up, unilaterally, by OCR without requesting consultation with the experts from the sponsoring companies, who agree, unanimously, that the requirements are too stringent and are unjustified in the light of well established industrial experience. Also it should be recognized that, relatively speaking, the private companies have as much at stake as OCR in the success of the project.

A further example of a frustrating reversal involved the technical decision whether to include gasification of the H-Coal product char as a part of the pilot plant. This step would be a part of a self-sufficient H-Coal plant, as it supplies much of the hydrogen required for the process. However, it is not vital to the pilot plant because the hydrogen by char gasification is being studied broadly elsewhere. A decision was made by HRI and OCR prior to the first proposal that gasification should be included, so it was, even though the sponsors were agreed that it was unnecessary and represented an unwise additional expenditure. A year later, when the contract had to be redrawn, all sides agreed that gasification should be left out. Without going into the pros and cons of either decision. I make the point, here, that better early communications would have obviated a time- and money-wasting vacillation.

Getting back, now, to the timetable, the net result of the revision was that a new contract for just Phase I was signed by HRI and OCR on September 4 of this year, ten months after OCR's original contract was submitted. In the meantime a letter of intent was prepared in May 1974, to allow reimbursement to HRI for the work already done and to keep their staff together.

According to the Government rules, contracts for Phases II and III cannot be negotiated until certain of the requirements of Phase I are met. Thus, if these were followed to the letter, severe additional delays could be anticipated. It appears, happily, that rules may have succumbed to reality at this point, as three steps have been taken in recent months which augur well for the future progress of the project. They are:

SL 4

1. It has been recognized that HRI is the only one capable of properly acting as the prime contractor for Phase I. In the light of all of the proprietary know-how they have developed over the past 12 years, the advantages of their position over an outside contractor would have made truly competitive bidding unrealistic. Thus, HRI was designated prime contractor for the design of the pilot plant without competitive bidding.

2. The construction phase was scheduled to begin in November 1975, and be completed by September 1977. It was apparent that this would be virtually impossible if all of the decision-making were done in series as prescribed by the Government rules. To solve this dilemma, HRI negotiated OCR permission to solicit bids on long delivery equipment items now. Originally, it had been ruled that design must be completed and Phase II approved before this step could be taken.

3. Three of the private sponsors, Sun, Ashland, and Standard of Indiana offered sites for the demonstration plant within the boundaries of one of their refineries. Each stipulated, quite naturally, that they must be the operator of any facility at their site. Since the advantages of using one of these sites were so apparent, OCR agreed to forego broader competitive bidding in favor of evaluation of each site and its ancillary facilities by an OCR-HRI team. This led to the recent selection of the Ashland refinery at Catlettsburg, Kentucky, for the site, with Ashland as the operator.

Having tasted success at removing these potentially delaying barriers, I am hopeful that some of those still looming, such as the stringent test requirement of the work program, may be negotiated in the same flexible manner. I should add, of course, that this must be without in any way jeopardizing the technical success of the project.

At this point, let me summarize briefly before going on to try to draw some conclusions. In the 23 months since the H-Coal pilot plant was first proposed, four concrete accomplishments have been made, other than the on-going research, technical problem-solving, and some plant design efforts:

1. A contract for a continuing work program and plant design has been signed.

2. Five solid private industry sponsors have been obtained.

3. A site and an operator for the plant have been selected.

4. Some long-lead time equipment has been ordered.

All of these were accomplished within the last three months.

Let me, at this juncture, also review the principal points of contention which led to delays or wasted motion: SL 5

SLIDE 4

## PROGRESS DESPITE BARRIERS

1. Phase I contract to HRI without competitive bidding
2. Long-lead time equipment ordered
3. Site selected and operator named (Ashland)

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SLIDE 5

## MAJOR POINTS OF CONTENTION

1. Reversal on background patent policy
2. Lack of consultation with private sponsors
3. Reversal on rules for a contract
4. Stringent work program requirements
5. Reversal on inclusion of gasification in the pilot plant

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1. On the background patent provisions, the policy was reversed and remains in an unsatisfactory state from HRI's standpoint.

2. Private industry participants feel that they have not been consulted sufficiently on technical matters.

3. The reversal on rules for the contract was a serious setback.

4. The stringent requirements of the work program are still a matter of concern.

5. The late reversal on inclusion of gasification in the pilot plant scope should not have been necessary.

After noting this record of accomplishments and of deficiencies, I'm sure there will be varied judgments on which changes and delays were necessary or served a useful purpose. In my opinion, however, the total process took about twice as long as one of us from private industry would expect.

I hope you will remember my comment at the outset, that I was presenting this to be helpful, as I may have been sounding rather critical. However, I felt it necessary to include some details as a basis for my conclusions and four recommendations which I feel could be useful.

SL 6 1. The first of these has to do with possible revisions to the procedures under which we are to form our Government-industry joint projects. One set of factors seems quite clear: Rigid legal requirements for competitive bidding are not appropriate for a multiphase project which is inherently based on one company's proprietary know-how. Many energy-development projects may be of this nature. Thus, it would be highly desirable to provide a procedural framework which offers some flexibility and is designed to get the job done under the existing conditions. It is quite feasible to protect the public interest at the same time. This situation is not materially different from two private companies or individuals contracting to promote their best interests. Not to cite them as a shining example, but my Company enters many licensing and know-how transfer agreements with the agencies of foreign governments. Here there is often deep distrust and a "protect yourself at all times" atmosphere on both sides when negotiations begin, but they've had an excellent success record. Now that ERDA is set up so that we know who will be responsible for what projects, I would like to see a joint industry-Government committee formed to recommend the regulatory or legislative changes needed to provide this flexibility.

2. Another need, as seen from our vantage point in private industry, is for greater stability in the organization, responsibilities, and policies of the agencies with which we deal. This problem no doubt had much to do with the "rules change" and other delays in our H-Coal project. I don't wish to overreact to the extra-high state of flux in Government over the past several months, but we in industry are gearing our organizations and manpower for long-range commitments to new energy resource development, and it is important that the Government do likewise. I realize that shifting political winds make this difficult, but there must be some way it can be improved. Perhaps ERDA will do much to bring this about.

SLIDE 6

## RECOMMENDED CHANGES

1. Design rules to fit needs of situation
2. Provide organizational stability
3. Give more thought to better communications
4. Work on improved "attitude" on both sides

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3. I almost hesitate to make my third recommendation as the term "communications" is overworked and has become as common and noncontroversial as motherhood. However, I do have a point to make concerning communications. Official negotiations, of course, have to be at arm's length, but there's no reason why consultations should not be held at the appropriate time. If this could be before bid requests are issued, it would go far to pave the way for successful projects. Three additional cases serve to illustrate the need for such consultations: In the H-coal proposal, the work program was originally set up to give priority to boiler fuel. Later this had to be broadened to include syncrude operation, both to attract oil company sponsors and for the very practical reason that a full range of products will eventually be needed. Another example, the bid request from OCR for clean boiler fuel from coal received only three responses, and only one of those was serious, primarily because the RFP came out with too many untenable and/or complicated clauses inflexibly chiseled into it. In a third recent case, the Bureau of Mines' request for bids on a micellar-fluid process for tertiary oil recovery did not attract any of the larger companies who have the advanced know-how. Here, again, the overriding deterrent was fear of the detailed "red tape" which had been put into the requirements. Earlier consultation with members of the industry, to elicit their interest and areas of concern, could have made these requests much more popular, so some real competition might have ensued.

4. Going to my fourth recommendation, it is concerned with the "people problems" alluded to earlier. Basically there seems to exist an "attitude" characteristic of each side, Government and industry, which could greatly deter our ability to cooperate on projects. From industry's viewpoint it often seems that the Government attitude is overly defensive, protective, and cautious, rather than being determined to eliminate all obstacles to getting the job done. I can't speak explicitly from a Government viewpoint on industry's attitude, but I suspect there may be some feeling that we're overly aggressive, and perhaps hasty in our decision-making.

If these fairly represent the two attitudes, they do form a barrier to cooperation, but at the same time, could complement each other if softened and mutually understood. I have no panacea for removing this barrier, but I am certain that as we work together more closely the attitudes will soften. I have two examples which fortify this belief. In the negotiations with foreign government agencies, previously mentioned, the technique used (and often required by the language barrier) is to sit around a conference table for days discussing and re-discussing minute details and learning just how each participant thinks and reacts. This serves two purposes: it pins down the negotiations and builds respect for the adversary participants. The other example comes from some preliminary results of the President's Commission on Personnel Interchange in which high-level executives from industry and Government cross over. The common thread running through the comments from the participants interviewed was to the effect that the people in both sectors were much the same in competence and dedication, but the industry way was faster moving and the Government way more circuitous in decision making. Perhaps the techniques and lessons from these examples can be utilized to help remove barriers in our field of cooperative projects.

In drawing my talk to a close, I would like to refer you back for a moment to my statement concerning the vital importance of finding ways to build Government-industry consortia. We in the energy business seem to be at bat first in this respect, but the same urgency may well apply to other industries and other agencies down the road, as the Government pours more R&D dollars into civilian technology. No matter which version of Project Independence is finally put into practice, capital requirements will be tremendous, with Government and the private sector expected to spend over $20 billion during the next five years. Neither one can or should do it alone. Energy companies would be jeopardizing their future existence by taking such risks on their own, where prospects for short-term profitability are poor. They need Government help to share the risk, possibly by providing at least a floor under the incentives. On the other hand, after a year of relative apathy toward Project Independence and its goals, its true importance, and the dire consequences of not pursuing it, are now finally being recognized. Faced with this magnitude of joint spending and responsibility, a well-working partnership between Government and industry becomes a necessity - and now.

It has been a pleasure to participate in this panel today. I am sure the co-sponsors will conclude it has been a worthwhile effort. Thank you for your kind attention.

# AN ENERGY OVERVIEW

Unscheduled Extemporaneous Remarks By
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I guess I might start by recalling an analogy that Jim Webb used earlier in the NASA program when he had been around for a short while. He said the situation reminded him a little bit of the problem of carrying a grand piano on his back up a staircase while leaning over and taking out his appendix. Now, I must say maybe we need to add something. Perhaps after listening to this discussion by Phil White, there are some things that need to be removed that are proving to be impediments in the way of progress.

In any event I say this because I want you to know that at the moment I am still in the National Academy of Engineering. At the moment it is I and my secretary with an avalanche of mail and phone calls and deep concerns expressed by many people flooding in on us.

I don't have the machinery to deal with what I know are urgent national problems. Hopefully this will change soon. I have gone through the confirmation process and I'll be in a new office. I'll have left the Academy of Engineering within a few weeks and shortly thereafter the various elements that will initially go to make up ERDA will be folded into the organization.

Obviously there is just a tremendous amount of competence available in the AEC, the Office of Coal Research, the Bureau of Mines, NSF, EPA and so on, that we'll be drawing on.

Now, when people see me they say, "Congratulations, I guess." Sometimes I reflect on this. I reflected on it a great deal before taking the job. I kept coming around to something we have all come to realize. There is a very delicate balance between energy supply and demand that we didn't realize. We certainly found out last winter how delicate this balance is and came to realize that even though things have eased at the gas pumps, we're headed towards more and more serious times. In a way the Arabs did us a favor by dramatizing the situation before it got even worse.

Some people think it is a put-up job to raise prices, but I think most people understand it is a real problem. What we don't seem to agree on is exactly what we will do about it. It was in that context that I agreed to do what I can to help out by becoming involved in the formation of ERDA.

Now, as a backdrop to that decision, we in the Academy last winter carried out a study which we called "U.S. Energy Prospects From An Engineering Point of View." We didn't try to look at the situation from an econometric standpoint. We tried to lay out what might be feasible from the engineering standpoint - knowing what we do today - to obtain some relief in about a ten-year period. We picked ten-years because that really is about the time it takes to develop a program, to obtain the support for it, to design, to build, to test, and then to get on-line with whatever the new operation is in sufficient magnitude that it really counts for something in terms of millions of barrels a day.

We felt it was something that had to happen ten-years from now and it had to be initiated fairly soon and consequently you had to go with the "private technology." There wasn't time to carry a whole R&D program and then make a change in ten-years.

We pulled together a group at the Academy of Engineering and took a look at both the supply and demand side. We asked how close can we come to bringing our imports down to zero or close thereto in about ten-years.

We took a look at the coal industry, for example, and we thought that there we could probably go from the 600 million tons up to probably twice that amount in a ten-year period. We realized that this brings on some very, very difficult problems. Problems of water, for example, particularly out

West for rehabilitation of land if we continue surface mining. Tremendous problems of transportation are involved. We estimated that to get the coal to where it has to go you have to move it in a big slurry pipe or, of you use railroads, you get into what we estimate to be on the order of 8,000 new locomotives and maybe a hundred thousand new gondola cars. The dimension of what is involved became more and more staggering as we made this list of things that we felt could be done. We're not saying that they will or should be done.

We took a look at the whole oil and gas industry and took into account that the Alaskan Pipeline is on the way. We felt that the exploration of the Continental Shelves had to proceed aggressively. We felt that we have to get into secondary and tertiary recovery. But again, we kept running into tremendous outlay requirements, first just in the exploration, drilling and so on and the fact that there are not many rigs that can operate over several hundred feet of depth. These rigs are like ships; they are not something that you obtain overnight. We got into what is involved there.

We also took a look at nuclear and we postulated that we could move ahead certainly more rapidly than we are today bringing on present-day type nuclear power. We felt that this is something that could be done maybe up to the level of 250 or so stations in a ten-year period.

We took a look at this to see how much increase in supply would be obtained. We then had to look at where we would stand if we did nothing. We are now at the equivalent of 30 million barrels a day. If we ride along the way we are going, we will drop down to about 20 million. The increase from the supply side has certainly leveled off today and it will drop off unless we expand the supplies.

Then we took a look at where we might want to be. We are now using around 36 or 37 million barrels a day. If you project at a growth rate of around four percent you are suddenly up to 58 million barrels a day. The gap there of

38 is prodigious, particularly if you multiply it out in terms of $10 a barrel. That would be what we would have to import.

So, this told us that there certainly is a very real problem and even doing all the things I have alluded to briefly on the supply side, there is still a gap of around 18 million barrels a day in 1985.

So it became apparent that much more concern should be placed on the conservation side. We talked about what we could do about transportation, to improve efficiency of heating buildings including residential homes, and to improve efficiency of industrial processes. We're not talking about what you can see as a gleam in the eye, but what would have a major impact in terms of millions of barrels a day ten-years from now.

We felt that we could probably get down to a factor of eight or ten million barrels a day. Again, it would require a prodigious effort. This way, having the growth rate at about 2.3 percent rather than four percent and by the tremendous increase in the supply side, we might be able to bring supply and demand together.

Then you add it all up and you find that there is a capital investment of around 600 or so billion dollars to be contended with. The question is where does all that money come from?

You have then the problem of manpower, too, and the probable deficiency not only in terms of miners and construction workers, but certain engineers, chemical engineers and so on.

As a matter of fact, by doing all that, what you have really done is bought yourself time - time to bring along some new developments both on the supply side and on the conservation side.

So, we in our report didn't take a look at the next phase, but it is really the next phase that ERDA is all about.

Just one thought on this now. Even with all the action that I have described, you still find a low overall supply and demand. It may be close. On the oil and gas side there is a deficiency and adding everything up we would be dropping imports of gas and oil from the present level to a few million barrels a day. So it became obvious that you have to convert on the use side over to coal or some other form of energy away from oil and gas.

It also brought home rather forcibly that we ought to be working on the conversion of coal to liquid and gaseous form; gasification and liquefaction then become very important. We did estimate that in a ten-year period we might just be bringing in gasification and liquefaction plants to the point where they would have some impact but not a very large impact, maybe less than a million barrels per day.

Now, with that as a backdrop, what is ERDA all about?

Well, ERDA's role is really to assist in every way that the agency can to help out towards the kind of program that I have just described. Really and truly the ERDA job is to look beyond 1985 out into the '90's and into the next century.

Here I won't go through the sort of a litany of the areas that need to be worked on, but clearly you want to work on every energy source that has potential and you want to look at every way we can conceive of to conserve energy.

I just do want to emphasize that the conservation side is going to have a much, much stronger role to play in terms of dollars than the present budget would indicate. There has not been time to put together a meaningful program and until there is a meaningful program there is no point in putting in the dollars.

Now, in carrying out this program, oftentimes the analogy is made that if we can go to the moon, clearly we can solve the energy problem; or we have to take the same action in energy today as we did when the Sputnik went up in the '50's.

But this is one area that has to be kept front and center all the way. I won't say it was easy to go to the moon, but I will say that this was an example where there was a very single purpose objective and where the total responsibility was in the hands of NASA. One Government agency was responsible for all the research and development as well as the operation. Whereas, in the case of ERDA, not all by any means of the research and development will be carried out in the Government and the delivery system is almost entirely in the private sector. Any work that is done in ERDA has got to have in clear perspective all the time, "Can this be commercialized?" "Is this something that is clinically viable?"

Or if it appears to be an area where for reasons of self-preservation we should be working on it and we should put it into operation, what kinds of Government support will be required if it is in the national interest; some form should be provided if it is not economically viable, but what form can that take?

Now, as a related matter - and I think this is particularly true in the conservation area - it is easy to imagine a project of, say, a building where you come up with the best possible solar convertor on the roof, pumps and storage tanks, better insulation and all kinds of things, but, there has to be more to it at the start than just a new demonstration. What one has to do is think not only of the hardware but what I may choose to call -- I am not sure it is the best word -- the software. What is the strategy going to be if we carry out a certain physical development of then moving to the next step - that is to have this development used.

Now, some of the steps that have been discussed here were in connection with contracting out. One can imagine cost sharing programs, and there are such programs; and of course there is the matter of patents which is important; and there could be price supports and there could be a variety of things. What is needed in the strategy is what might be thought of as the equivalent of a depletion allowance for conservation, if you will.

That certainly has stimulated the oil industry and certainly it was very successful for a time. But we need something equivalent to that as a strategy in the next phase of our whole energy supply and demand program.

I don't know what the right answer is. I do know that in our programs in ERDA we're going to be looking at this software side in this area intensively. To repeat, there is no point in the Government having a lot of physical hardware development unless we can conceive of how it is going to be useful in the delivery of energy or improving the efficiency of energy in this country.

I could say a great deal about the need in doing this to work effectively and cooperatively with the industrial community. I heard as I came in, and I agree, this must be done, but it is in this context that it must be done.

I would just close by saying the Commerce Department should be congratualted on getting you all here for making comments on these matters. When ERDA does come alive, I look forward to having similar kinds of meetings with industry to try out ideas and to get ideas as we go along.

It must be a continuing exchange, and this is particularly important during the early years of ERDA, so that we get the program going in the proper direction.

So, again, Betsy, I thank you for including me here today and I look forward to working with all of you. Certainly the country needs your support as we move in on what is certainly one of the most critical areas that we as a country face and that the whole world faces at the same time.

Thank you.

## GENERAL DISCUSSION: AFTERNOON SESSION

DR. COLLIER: We are now to the afternoon's discussion period. I would like to first introduce one of the discussants, Keith Clearwaters; and, Keith, why don't you take a seat up here because your boss did a lot of work this morning and you may have to do some more this afternoon.

Keith Clearwaters is Deputy Assistant Attorney General for Antitrust, and he is substituting for Tom Kauper.

As we did this morning, the discussion will be open. I would ask the speakers of this morning to gather down here. I think there are spaces allocated for you so people can find you if they want to fire another question at you. There will be microphones here to facilitate the discussion we hope to have.

Those of you who have questions, please identify yourself and indicate to whom the question is being directed.

The floor is now open for discussion on both this morning's and this afternoon's topics.

QUESTION: I am Jim Kerr, Continental Oil Company.

Considering the Government contract research, one of the things we seem to come across is some of the broad language which I note is still in the patent policy. I refer specifically to the language in the course of or under the contract. This bothers me somewhat. We fear that this will reach into areas of our technology, since we are not connected directly with the contract work we might be doing; also because the people doing the work will not be insulated from the rest of the research people.

So I would be interested in some discussion on the meaning of that wording as opposed to some wording which would speak to the field of endeavor.

DR. COLLIER: That sounds like a question for you, Betsy.

DR. ANCKER-JOHNSON: What was the last part of your question, please?

QUESTION: I am referring to the broad language in the course of, for example, or under the contract, as opposed to some wording which would simply restrict the patent rights to the field of endeavor in the contract.

For example, if the contract were on coal gasification, then the patent rights would be limited to those patents in the field of coal gasification.

DR. ANCKER-JOHNSON: I would like to toss that question to the Executive Committee Chairman of our Government Patent Policy Committee, who is seated almost next to you, sir. He was a member of the staff which negotiated this exact language. I am referring to Jim Denny.

MR. DENNY: Well, I think we, too, would like to know what those phrases mean.

It is a phrase that is in the Atomic Energy Act and, therefore, a slight modification of what is in the NASA Act. It is a phrase used in the President's policy and we have had very little court decisions as to what it means.

One fairly recently which more narrowly construed these words is now available. I think it is probably a body of law that we will have to look at in the CCPA and in the Court of Claims. It would include as these words are alone inventions made as a result of the Government research program whether it would be in the area of coal gasification or others.

I believe the overall language in the patent area is broad and if we want to further define what this is, we would have the possibility to do so in any case.

DR. ANCKER-JOHNSON: I might add that obviously the next step, once this bill is enacted into law, is to write the regulations which, of course, would be Dr. Seamans' responsibility. That would help clarify, I believe, the meaning of those words.

DR. COLLIER: Do we have another question?

QUESTION: This is not a question, but it is more a comment related to Mr. White's presentation. As I noted, I am Frank Wolek, University Science Center.

We are doing a study of consortia for the Office of R&D Assessment for the National Science Foundation, studying the contribution that would be made to the R&D effort that results from programs of trade associations, academic institutes, consortia on an established basis with several firms.

One of the things that really has stood out in our work is the feeling of a very great respect for these cooperative groups. The work that they are doing is very valuable and is making important contributions to the country. The people, as we have seen them very frequently, have a breadth of perspective that is unique in their fields. They are motivated by economies of production--suppliers and producers of intermediate raw materials, producers of a final good and then users. These divisions very frequently do not conform with the kind of cooperation that is needed for technology to result, for example, in fabricating of a building and all areas of the textile industry. These cooperative groups have the perspective of an industry as a whole. They focus on information oriented types of work, and this gives them an academic flavor which gives them respect and audience with the academia, but yet their industry membership gives them a practical flavor, also.

How can these various areas be put to use for the good of the country?

Well, one of the areas they are working on is the environmental effects. In this area, we found that the consortia frequently have a viewpoint of the interest of the public as a whole. For example, the American Gas Association is conducting a very important study of the influence and impact of nitrous oxides on the health of people.

These organizations have the industrial contacts and when they have done a study, they can go out and get an audience that respects industry -- they are not just an adversary type of group. They are listened to and change frequently results. Because of their experience, they can build on successful experiences in one company to relate them to another company. They have word of mouth reputation in the industries. They have continuing commitment to these areas of technology, and the textiles industry is a good example. It is just not a one-time contract type of commitment.

Despite these advantages that these groups could bring to our problems in quality of life and pertinent technology, what do we find? We find, for example, that some groups have a policy which is against work with the Federal Government in any kind of Federal funded programs. In other groups the administrators are under continual pressure. Fifteen percent of his money comes from Government contracts. Fifteen percent of his staff time is devoted to obtaining work on Government contracts. You can bet that his board of industrial memberships is giving him continual pressure to drop those Government contracts.

The problems that cause these pressures and cause policies of not working with the Government are those connected to difficulties in delay, difficulties in standardization between one agency and another that require excessive amounts of time, review procedures that involve people for months, and people involved in the practical level involved to review these procedures, delays in hearing about proposals, and the result is that I think a great deal of benefit is being lost and a lot of wasted studies are being conducted by people who don't have this practical experience and continuing commitment to these fields of technology.

So there is one area we have studied. What the Government can do on patents and we don't hear much in the way of a call for change. But when we get to Government contracting procedures, the ability of these consortia to work hand in hand and plan with the Government what research needs to be done, to deal specifically on contracts that they can get from the Government or give the Government laboratories money to do work -- these kinds of contracting and day-to-day interactions we have considerable complaints on.

DR. COLLIER: Do you have any comments?

MR. WHITE: I can only concur with the point Mr. Wolek has raised. This is an area that needs attention and the one suggestion I repeat, perhaps a way to approach it -- and I am sorry Mr. Seamans is not still here -- but as ERDA is formed that dialogue is performed, perhaps with an ad hoc committee between Government people and industry, to see what changes can be made. Maybe some of them will require legislation, but probably most are procedural matters and some will be in attitudes to get this work the way it should. You only have to think back to the situation that existed during the war when we knew we had to move and move fast. The objective of getting the job done was paramount and everything else was pushed out of the way and we moved very rapidly. We can do it and I think the situation today is just about that critical. We have to move very rapidly because the job to be done is so tremendous, not just to get a technology, but to get it to the application stage so that we get enough bridging of the supply-demand gap to make a difference ten years from now.

MR. COLLIER: Question?

QUESTION: I am Allen Harris. I am the U.S. coordinator for the NATO Committee on the Challenges to Modern Society. I would like to add another dimension to the discussion today which I think, since we are meeting in the State Department, should be added.

That is, that the United States, Secretary Kissinger, has recently announced in a Chicago speech that the United States expects to play an important leadership role in terms of the development of energy resources, new energy resources within the non-oil producing OPEC . countries.

The United States for a very important national security consideration aspect, will have to play increasingly vital role in terms of stimulating and coordinating research and development, not only between industry and Government as we focused on it today, but also between governments and between industries abroad. This is a thing which has not been dealt with, and I would appreciate any comments that anyone on the panel might have to make in this regard.

DR. COLLIER: Well, I know that there are a number of science and technology agreements being set up around the world and I think we do need some clarifications as to just exactly the role industry is supposed to play in those agreements. I would look forward to some guidance coming from the State Department in that area.

QUESTION: I am Barry Moyerman, chief patent counsel for Air Products & Chemical.

I would like to address a question to Dr. Ancker-Johnson.

In her talk on one of the slides she mentioned the existence of a reduction to practice as a means of measuring Government entitlement to certain patent rights.

Reference was made to the fact that the filing of a patent application which constitutes a constructive reduction to practice is not a reduction to practice in fact.

Our experience with Government contracts has been that the negotiator for the Government utilized, in determining the existence or non-existence of a reduction to practice, the rules used by the Patent Office in its interference proceedings. These proceedings, I think, are a rather archaic institution that are unique in the annals of law. According to them, for example, one reduces to practice an airplane windshield by putting it into an airplane and flying it at conventional altitudes.

The reality is that such a windshield may well be tested in an environmental chamber in the laboratory.

The question is whether there is anything inherent in Government contract viewpoints of using this test of reduction to practice, as distinguished from tests more often used by industry?

DR. ANCKER-JOHNSON: I think we can best answer that by saying that the ERDA Administrator is not bound, according to this new legislation, to past procedures and thus we can hope for a set of regulations to be written now, based on this new legislation, which will avoid what you called -- and I think with some real justification -- archaic procedures.

Do you want to add anything to that, Jim?

MR. DENNY: No, ma'am.

(Laughter.)

DR. ANCKER-JOHNSON: Maybe you want to subtract from it?

QUESTION: I am Chuck Eaten from Waltham, Massachusetts.

It seems to me as though constructive reduction to practice is something that is relatively easy to determine and the policy of the patent system is to encourage early disclosure of inventions.

I see no reason why constructive reduction to practice should not be an adequate test for determining that the contractor is entitled to rights in the invention.

This is particularly important where the contractor is a relatively small business. For a large business, it is relatively easy for the patent counsel to say, "Now, look, this looks like a good idea, put in your money to develop this to a point where it has been reduced to practice, because then you will retain the commercial rights to it."

But for a small company this may be difficult to do. So, I would suggest that consideration should be given to say that all rights in an invention that has been constructively reduced to practice may belong to the contract.

DR. COLLIER: I take it the Commerce Department agrees with you, or has noted it.

DR. ANCKER-JOHNSON: We have noted, yes indeed.

QUESTION: This morning, Mr. Kauper stated the principle which I think most of us would agree to, that performance is better when there is a reward for success and penalty for failure. Let's start with the assumption that we want to include all possible incentives in the energy program including the incentive to build a business or expand the business based upon private investment of funds.

What is the view of the Department of Justice with respect to mandatory licensing in a situation where the developer and patentee is ready and able to supply from his own factory the products necessary to fill the public need?

MR. CLEARWATERS: Well, I am not -- I have not followed very closely the legislation that Betsy discussed. However, I do not believe that it is our position that there should be no exception to a nonexclusive license that indeed, that is one of the competitive rewards of the patent system and should be continued.

I think that you have got the problem of, from the standpoint of Senator Harte and other people in the Senate, the problem of giving up what is viewed by them to be part of the public domain. And there is a balance that has to be achieved and I think the kind of compromise that Betsy has worked out tends to achieve that balance, although I can see -- and this is just my observation listening to Betsy's speech -- I can see some internal conflicts within that legislation from the standpoint of how a lawyer would look at it and what the standards to be applied should be.

I think if you start with the proposition that a patent is a lawful monopoly recognized by Congress as such to encourage an inventor to recapture whatever his research and development costs are, and then some in terms of a profit, I am a little confused as to how, Betsy, that would be tested under a Clayton Act Test.

It seems to me you acquire a patent that would give you some substantial market advantage within a particular product line, that that may tend to "lessen competition" in many lines of commerce.

I think we might need legislative history on what Congress intends with that type of Section 7 test.

I think the standard that looks at what this might do in terms of further concentrating a particular industry in terms of a license is something that ought to be part of that balance.

I don't think Government should be party to or encourage further significant concentration in an industry that may already be concentrated.

I hope that is responsive.

QUESTION: I am not sure I made my question clear. I was not discussing the thing that Betsy had discussed, that is the legislation, but the mandatory licensing that did not find its way into the legislative result.

MR. CLEARWATERS: Well, I might say that I am not familiar with the various legislative options. I am simply standing in for Mr. Kauper. I feel a bit like the guy Lincoln quoted who said, "If it weren't for the honor, he would just as soon walk."

QUESTION: Dr. Salsbury had some various nice remarks to make about the bill which was reported out by the conferees as an improvement over the previous legislation which was under consideration.

I would like to ask what would Dr. Salsbury suggest as a further modification of the bill, as reported out by the conferees to be applicable as a Governmentwide patent policy and if such could be enacted?

DR. COLLIER: Could you identify yourself?

QUESTION: Francis Brown. I am a lawyer in Washington.

DR. SALSBURY: Let me start by saying I am not a patent attorney or an attorney. In answering from my point of view, the things that still bother me are, first, that we are operating again in "quicksand". The conditions can change after the fact.

I think this is a poor way to do business, and you wouldn't do business this way unless you had to.

I think the other parts of the Act are reasonable and we can live with them.

DR. COLLIER: Yes.

QUESTION: Gogilecco. I am with the University Center in Philadelphia. One of the objections we come across in our study is the following. Most of the research organizations are nonprofit organizations and so then they go out and get the patent and they are not allowed to use that to reduce the contribution of their members because that would be like giving it to the members.

In effect, are you not removing incentive to step up cooperative R&D so that ultimately, the fruits would flow back into research?

If you step up too much today, then industry has to continue to keep funding that amount. Because of that, they are not willing to stick with the program right now.

DR. COLLIER: Does anybody on the panel care to go into that?

DR. ANCKER-JOHNSON: If I have understood the question, I think the legislation which we now expect to be enacted as described to you, does give incentive for either individual companies or consortia of companies to do R&D, because first of all, there is a very strong possibility of being able to keep the patent rights or, alternatively, to obtain exclusive license. That sort of protection provides incentive.

QUESTION: No, they would keep their patents and royalties, but they cannot use the royalties to reduce the contribution of their members from what it was last year.

DR. WOLEK: The issue is one of tax consequences, not a question of patent law.

DR. ANCKER-JOHNSON: I am afraid none of us here feels competent to go into that subject, do we?

DR. COLLIER: I guess we will have to take that one under advisement.

QUESTION: I am Rabenfeld of the Textile Research Institute, Princeton University.

I would like to comment on the cooperative R&D picture, admittedly, though not the principal subject of the seminar, which of course, was to examine the institutional and legal constraints to cooperative R&D.

But it appears to me that implicit in the discussion this morning, as well as this afternoon, is the fact that there is a viable alternative to cooperative R&D, not just in energy related matters, but in other matters requiring massive national effort.

Clearly, the only possible alternative to cooperative R&D is individual corporate R&D. My point is that I don't believe that that is in fact a viable alternative. The magnitude of the technological problems that we are addressing with energy as one example, is such that it simply does not permit individual concerns to address the problems in the manner necessary to find solutions.

The costs of modern R&D and the relative importance to these matters is such that no individual can afford it nor can the Nation afford the duplication of effort that is implicit in that noncooperative approach to the solutions to our problems.

The most important commodity in the solution of these national technological problems is creative and managerial manpower. That is probably the commodity of shortest supply in our country now, even though this country is endowed well with that commodity, relative to other nations. We hope and believe.

Nevertheless, it is in finite supply. Simply in terms of our ability as a Nation to devote resources to technology, to science and to R&D efforts leading to technological innovations is such that we must rely on the cooperative approach.

Therefore, the identification of institutional and legal constraints to this cooperative effort is of course, important, but we must not merely live within these legal and institutional constraints. We must see that these constraints and barriers are eliminated, if need be, by an appropriate legislative act.

I would just like to introduce this other point to the seminar.

DR. COLLIER: Mr. Carey would like to comment on that well-taken point.

MR. CAREY: I think I would agree personally with the assumptions that you have expressed here, about this whole matter, but on the other hand I have been walking around long enough and spent enough time in Government, and in the private sector to know that in this country the process of changing public policy is a very slow business.

We are built a lot closer to the ground than we like to admit and I think that the possibilities of cooperative R&D and a consortia deserve a trial. That is about as far as I go.

Let's try it. Let's see what we learn from it. Let's see if indeed, we find that it does not insult our traditions and our theologies.

Let's see if consortia work and whether we are better off or we are not. I think we have to try, and if we do that and if the political and legal environments give us a chance to find out, this is about what we want to get out of this.

As far as the legal and political constraints and barriers are concerned, they were all invented, you know, for one good reason or another. They have come to be accepted and built into the system.

I doubt very much that they are going to be kicked out quickly. I think that it is going to be a gradual business to change some of the practices that slow us down. They may interfere with what we have to do, but I should be very much surprised if we changed our whole national character of dealing with these problems.

When you think it over, there is very little that we do in this country by straight line decision making and by rational institutional arrangements.

I think we have to work within our legal system to accept the fact that it is going to be a muddy track at times; but if we can get the kind of policy environment that lets us innovate not only with our technology but also with our arrangements for getting things done, we will have something worthwhile at the end.

DR. COLLIER: Yes.

MR. SALSBURY: I would like to add something to both of these statements because there have been two important points made. I would like to add a third.

That is, the environment in which we are operating today is an international environment, and it's not a national environment.

I believe that a lot of the rules that we are using for legal questions in the U.S. are still national and not international.

We have got to change that.

Let me tell you what I am talking about.

In the area of cooperative research between large companies, we said this morning, that this is probably something that may have benefits for us. It may not. We have to be careful. I think this is being handled well and very easily on an international level.

I don't think that any of us in the technical community feel any constraints to setting up cooperative research ventures with large companies in Europe or in Asia or even a three-way deal.

But we all feel very strong constraints to doing the same thing within the U.S.

I don't think this is right. I think that means it's easier to work with international people when we really need to work more with the people in the U.S.

The second point is that we said this morning the system had been working well in the past, and we should be careful about turning it over. I agree, it has worked well in the past. But I think there are several things that are different now from what has been true in the past.

When we talked about technological advances in the past, we did not have the strong international capability that we do today. We must compete against the international companies, and they can compete with us very well. They couldn't do this before.

Another area is the cost of research which is much higher in relationship to the value that we are going to get out of it from what it was 20 years ago.

I think when you put all of this together, we are either going to have to operate differently, or we are going to find that the U.S. community will fall behind the international community.

DR. COLLIER: All right.

Bill?

DR. GOUSE: I would like to address a few comments along the same line.

I would hate to see anything happen that would somehow cut down on our ability to get into joint ventures of various kinds, not only between private companies, but between Government and individual companies and Government and groups of companies.

The problems we're facing, at least in energy, are so big that the resources that will have to be brought to bear will require us to do things in a half way efficient manner. Unfortunately, the present procurement system was not designed with joint ventures in mind. It was designed for fully funded Government activities. It doesn't preclude joint ventures, but it makes them almost impossible to negotiate.

I wasn't here for Dr. White's presentation, but I am sure he described the nightmare he is familiar with, and if it weren't serious, it would actually be comedy TV show.

I was involved on the other side of that, and it was just as frustrating trying to get a contract out, as it was for the people on the other side trying to get one. There is a p.s. to that exercise that they went through. It doesn't help their agony, but it does help some other people.

We were successful in at least getting a contract structure approved in an organization that doesn't understand R&D that was totally unprepared for rapidly increasing funding levels, and all the problems associated with it.

With that approved structure, we have taken three more pilot plants to contract on the order of six weeks each. Now, unfortunately, we're about to move to ERDA and the people that have been educated to approve these things are not going.

(Laughter.)

DR. GOUSE: I am sure that the first one of these that shows up at ERDA will be subject to one of these agonizing kinds of sequences of events, where solicitors and business-type people, whose total experience is virtually 100 percent Government funding, will have to learn how you set up a system, where the Government now shares management, shares decision processes and things that it's totally unaccustomed to doing.

But in spite of all that and the trouble associated with it, I would hate to see us stop it, because if we do it all inhouse, it will probably not be as useful, and worse than that it will probably be a secret from the people who have to implement it.

(Laughter.)

DR. COLLIER: Thank you.

Keith?

MR. CLEARWATERS: I suppose I ought to put my two cents in.

I think these kinds of meetings are very helpful in establishing the kind of dialogue between those Government agencies that are believed to be road blocks, and the private sector who entertains that belief.

I find it almost repetitive for one of these meetings to occur, but I gather they have to, and it's a continual process of education.

In 1971 then Secretary Connally spoke before the spring session of the American Bar Association antitrust group and stated that we had to amend our antitrust laws to provide for cartels of American producers to deal with the Yellow Peril and with the Germans in their consortia, and even from the private sector practioner he received a rather cold reception.

I am sure the view is still widely held, in spite of the fact that in 1971, there were hearings held by Senator Inouye to enter into a fact finding investigation of actual impediments and constraints which American firms found themselves placed in in dealing with foreign companies, in respect to the antitrust laws.

Three months of hearings were held, I think, though not seriatum, and they were unable to come up with actual impediments of the antitrust laws in dealing with the adverse balance of payments.

There is a psychology here, I think, that I noted when I was in private practice, and I still see and that psychology is the antitrust laws are very complex; they are -- I can't explain to you how a transistor works -- they are not as complex as scientific research and development. But they are viewed by company officials as being somehow a mixture of theology and mysticism.

They are not that complex. They are simple kinds of rules of conduct that this country has decided should be the standard of and for the American businessman.

Are joint ventures illegal? The answer is no.

Are they never illegal? The answer is no. They are sometimes illegal from the standpoint of common sense.

The smog case is an example of when they are illegal.

I don't think we really need a change in the law. I think what we need is a continual process of education of American businessmen, not only by people like me in the public sector, but by their own lawyers to tell them when certain joint ventures are legal and to go ahead. There are many that have been approved by the Department of Justice under business review procedures.

There are many that are going on right now in important areas that antitrust counsel advised their client, go ahead, you don't have to go to the Department of Justice.

So I suspect that much of the problem in terms of impediments in joint R&D in the energy area, is really a problem of acquainting oneself with what the legal standards are, just as it was a problem, it seemed to me, in the foreign commerce side.

DR. COLLIER: Thank you, Keith.

MR. PATTERSON: I am Patterson. I am with the Interior Department. I wanted to add a comment to what Bill Gouse said.

He indicated that one problem with agencies is that it's a learning process. Interior has 20 or more small agencies involved, OCR is one, and it's grown significantly in the last three years, from something like $40 million annually to approximately $800 million now.

One significant change in regard to the patents and other problems is that in procurement in general, they have grown from basic research type of organization into pilot plant development and demonstration plant development which, of course, raises more significant problems.

In regard to Mr. White's comments about the HRI process, I think this bears out Bill Gouse's comments, the first problem raised by the Solicitor's Office in that case was a patent problem. The basic difficulty is that there is not early review and that has been remedied by providing procurement attorneys in the early phases of these contracts. But it had not been done in that particular case. It's a matter then of catching the problem as it comes up. The problem in that case, though, was mandatory background patents.

It had not been required in that contract, and it had to be done under present Interior policy.

That is the problem you all run into in connection with the Congressional Committee.

One important change has been made as far as ERDA is that you have resolved that problem. There is no longer a requirement, at least you can waive mandatory compulsory background patent license.

I think that makes significantly more flexible situations for the Department.

DR. ANCKER-JOHNSON: Let me make a correction. The ERDA Bill under no circumstances calls for compulsory licensing of background patents.

MR. PATTERSON: All right, you did comment about foreground patents and the opportunity for waiver there. That is certainly more flexible than we have in Interior. But nevertheless, that problem came up the first time, and it was a NEPA problem. Competition was mentioned, but with the problems we have had with termination of helium contracts and the three year delays in the oil pipeline, we're extremely concerned that, even if it requires two or three months' delay, which is about what that caused in the later phase, that NEPA must be complied with.

This required studies and evaluations in the early phase of the contract. To the extent that it might be competed, we hope that that's possible at second and third stages, but it may not be possible.

I think the point is that in terms of the ERDA organizations, it's certainly going to be important that the agency review procedures are initiated in the early part of the contracting process, and that there are sufficient people in the ERDA staff levels to assist right along with the contracts, rather than review contracts, complicated contracts one year or two after negotiations.

I think one point of common regulations in ERDA certainly would be a good idea early on in the program, so that both sides know what the patent policy is, which is, by the way, not well printed in Interior as it will be in ERDA. So that, also, they know what the other consequences are.

DR. COLLIER: Thank you.

In closing the discussion this afternoon, I would like to remind you of two things that we said this morning:

The first one was John Tabor's remark that we had challenges in technology, institutions and political will. I think the most important of those is our political will, because the other things will take care of themselves, if we can change that atmosphere of political will.

A company begins to go downhill when its employees begin to perceive that the penalties for making a mistake are out of balance with the rewards for making an achievement.

The country will go downhill when its citizens feel that way.

I think if we can change the atmosphere away from that trend, we will solve a lot of our problems.

One step in that is to try some of these research consortia, and I would remind you of the offer of the Commerce Department to act as a helper in setting up research consortia, one or several, to see if we can get through the antitrust thicket with good will on both sides.

Thank you very much for attending.

(Applause.)

(Whereupon, at 4:25, the above-entitled meeting was adjourned.)

# STUDY
# OF
# LEGAL AND INSTITUTIONAL BARRIERS
# TO
# INDUSTRY PARTICIPATION
# IN
# COOPERATIVE RESEARCH AND DEVELOPMENT*

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* This report was submitted by the Industrial Research Institute, Inc., on February 24, 1975, to the U.S. Department of Commerce in accordance with Contract No. 4-35596.

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RESEARCH
INSTITUTE,
INC.

Founded 1938

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Under Auspices of National Research Council

24 February 1975

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Dr. Bruce B. Robinson, Executive Director
Commerce Technical Advisory Board
Office of the Assistant Secretary
  for Science & Technology
United States Department of Commerce
Washington, D. C. 20230

Dear Dr. Robinson:

Attached is I.R.I.'s report to the Department, completing our work under Contract No. 4-35596.

Under sponsorship of the Commerce Department, the managements of U. S. members of Industrial Research Institute were surveyed to determine their perceptions of the legal (antitrust) and institutional (government patent policies) barriers to cooperative research between companies or with the government in the field of energy research.

Replies to a mail questionnaire, numbering over 100 (47% of those queried), indicated that 85% of a representative cross-section of the I.R.I. membership felt that such constraints would be a problem in engaging in research consortia or taking government research contracts.

In depth interviews with the research and legal executives of a sample of thirty-five representative high technology companies revealed that, in general, companies avoided entering into joint research programs with other companies with whom cooperation in the market place would be construed as an antitrust violation.

Of equal concern to these companies were the government patent policies which inhibited companies from taking government research contracts in areas of their established technology for fear of losing their proprietary positions.

The interviews uncovered a third class of significant constraints to cooperative research, which were concerned with uncertainties as to future government interpretations of either antitrust or patent policies, and the red tape and attendant delays involved in negotiating with the government.

(over)

Eight case histories illustrating specific examples of the effects of these barriers were developed and summarized. All eight summaries are in the attached report. Four of the case histories were presented in full in a December meeting on this subject, held in Washington, D. C. under the joint sponsorship of I.R.I. and the Commerce Department. Full text of the four case histories that were so presented are to appear in the "Proceedings" of that meeting. They are also made a part of I.R.I.'s official report to the Department, appended to the attached text, together with a copy of the December meeting "Program".

It goes without saying that this topic deserves continuing government-industry dialogue. It is our hope that some of the barriers discussed in this report can be lowered, so that cooperative research and development can be most effective.

Sincerely yours,

G.W.mcBride

Gordon W. McBride
Executive Director

GwmcB:MMJ

# STUDY OF LEGAL AND INSTITUTIONAL BARRIERS TO INDUSTRY PARTICIPATION IN COOPERATIVE RESEARCH AND DEVELOPMENT [1]

by

F. L. Cuthbert

Principal Investigator

## SUMMARY

The study revealed that U.S. industrial R & D management is very perceptive of legal and institutional barriers to cooperative or joint R & D. These barriers or constraints take the form of concern for antitrust when the cooperative R & D is within industry, and concern for patent policies and government procedures when it is industrial R & D performance under government contracts.

Concern for these barriers has a real impact on the industrial R & D planning process. Case histories are available illustrating four instances in which concern for the barriers has been sufficiently strong to preclude participation in joint R & D, either within industry or with the government.

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Footnote 1. This report was submitted by Industrial Research Institute, Inc., on 24 February 1975, to U.S. Department of Commerce in accordance with Contract No. 4-35596, dated 24 June 1974.

## SCOPE

The United States is committed to both a short and long range effort to conserve, improve, and diversify its energy resources. It is generally accepted that the program will benefit materially from a cooperative research and development effort. Joint efforts are believed to be not only desirable but perhaps essential, largely because of the capital intensive nature of the R & D programs visualized, and the relatively high risk involved in the developments. However, it is also recognized that legal and institutional constraints may well exist which would discourage private industry from participating in such cooperative or joint R & D efforts.

Within this framework, the U.S. Department of Commerce has let a contract with the Industrial Research Institute, Inc., for a "Study of Legal and Institutional Barriers to Industry Participation in Cooperative Research and Development". The study was a natural activity for the Industrial Research Institute in furtherance of its purpose of affording "a means for industry to cooperate effectively with government in matters related to research". The scope of the work provides for the following:

1. Perform a study of the R & D planning policies of high technology corporations to determine their perception of the institutional and legal barriers (e.g., antitrust and government patent policies) to industry participation on the following:

   a. Industrial consortia for the development of new technologies to conserve energy or to exploit energy sources.

b. Joint industry-government R & D programs for development of new technologies to conserve energy or to exploit energy sources.

c. Joint programs on an international scale for the development of new technologies to conserve energy or to exploit energy sources.

2. Assess the availability of case histories documenting the possible barriers to joint programs. The case histories need not involve energy technologies but should illustrate the impact on R & D planning of industry's perceptions of legal and institutional constraints.

3. If case histories are available, a portfolio of documented cases is to be developed.

4. Prepare a final report summarizing the results of the above.

## METHODOLOGY

The study was initiated, after receiving approval from the companies concerned, by a review of the original data resulting from their participation in a study reported in September 1973, titled, "Barriers To Innovation In Industry".[2] The "Barriers" of interest among many others were antitrust and patent policies, the same barriers which might well serve as constraints to cooperative R & D. The eleven companies, whose data were reviewed, were all members of the Industrial Research Institute (I.R.I.). Information gained from this review was used to select companies to be interviewed and companies which might possibly have case histories of interest.

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[2] "Barriers to Innovation in Industry: Opportunities for Public Policy Changes". Prepared for the National Science Foundation (Contracts NSF-C748 and C725) September 1973, by Arthur D. Little, Inc., Washington, D.C. and Cambridge, Massachusetts, and Industrial Research Institute, Inc., New York, New York.

In the meantime, as the first interviews were being arranged, a questionnaire was prepared and approved by I.R.I. for circulation to the membership. Based on information gained from the "Barriers To Innovation" study, replies to the questionnaire, and word-by-mouth information, in-depth interviews were held with the top R & D managers and, in some instances, legal and patent department representatives of 35 of the top R & D performing companies in the United States. The companies interviewed represented, to some extent, a cross section of U.S. Industry, with an emphasis on those concerned with the production of energy.

## QUESTIONNAIRE SURVEY

Information concerning the study being conducted by the Industrial Research Institute, Inc., under contract to the Department of Commerce, and a simple three-question questionnaire, were mailed to 223 U.S. member companies of I.R.I. The questionnaires were directed to the top R & D managers of the company, in many cases the Vice President of R & D or an individual in a similar position.

The three questions asked were simply:

1. Do you consider barriers to be a problem in conducting cooperative R & D?
2. Do you have any case histories illustrating barriers?
3. Would you be willing to discuss case histories?

Replies were received from 105 companies or 47 percent of those queried. The industrial classification of the companies responding to the questionnaire represented a good cross-section of American industry as indicated:

| INDUSTRIES | COMPANIES |
|---|---|
| CHEMICALS | 22 |
| ELECTRICAL | 6 |
| METALS | 10 |
| PETROLEUM | 16 |
| FOOD | 9 |
| MACHINERY | 15 |
| PAPER | 6 |
| GLASS | 3 |
| PHARMACEUTICAL | 3 |
| OTHER | 15 |

The "other" classification includes rubber, building materials, direct consumer products, and textiles.

Not all respondents answered all three questions. Of the 105 responding, 85 percent considered constraints to be a problem in conducting cooperative R & D and about half of these indicated they had case histories.

Some few companies, 20 in number, responding to the questionnaire indicated that they did not consider legal and institutional policies to be barriers to cooperative R & D. About half of these were primarily concerned with direct consumer products, mainly in the food industry. One company did not consider barriers a problem because of their membership in an R & D oriented trade association which apparently fulfilled their need for joint R & D. Another company had engaged in cooperative R & D, both with other companies and with the government. It was their belief that they were able to do this in a manner satisfactory to them because of their relatively small size in their industry and evidently did not experience significant barriers.

Information from the questionnaire responses was used to arrange interviews with additional companies, to the extent of time available, with the purpose of seeking case histories that could be documented.

## INTERVIEWS

As mentioned earlier, interviews were conducted with the top R & D manager, or his representative, of 35 Industrial Research Institute company members. In several instances, a legal department or patent man joined the discussion. While the majority of the companies interviewed would be classified in the chemical and petroleum industries, representatives of other industries were selected to provide somewhat of a cross section of American industry.

The actual industry classification of the 35 companies follows:

| | |
|---|---|
| CHEMICALS | 7 |
| ELECTRICAL | 3 |
| METALS | 4 |
| PETROLEUM | 8 |
| MACHINERY | 4 |
| PAPER | 2 |
| PHARMACEUTICAL | 2 |
| OTHER | 5 |

Again, the "other" category included rubber, building materials, direct consumer products, and textiles.

Interviews took the form of first discussing the company philosophy with respect to cooperative R & D and management's perception of legal and institutional constraints to such work. The impact, if any, of concern for constraints on the R & D planning process was discussed.

Actual experiences of the company with cooperative R & D programs were reviewed. Industrial consortia, joint industry-government R & D programs, and joint programs on an international scale were considered. Finally, the interviews provided an opportunity for comments pertaining to any phase of the study, i.e. antitrust, patent policies, federal agency practices, etc., being brought forth and discussed.

The interviews revealed that R & D managers are very perceptive and sensitive to both legal and institutional constraints to cooperative R & D. While the policy of the company toward cooperative R & D was very seldom reduced to writing, it was evident that most companies did have a policy which was clearly understood and adhered to. As one might have expected, the philosophies of the companies varied greatly, from one of desiring and seeking joint programs of the consortia type and/or with the government, to one of engaging in such programs only under specific circumstances. The circumstances most often mentioned was when the technology involved was one of unique interest to the company, one to which they could contribute, but had not yet built up a background technology position.

Some companies would not consider cooperative work at the research level, but only at the development stage. This approach provided an opportunity for them to develop a proprietary technology background and patent position before seeking outside assistance. Yet another company considers cooperative work only on processes. Because of their concern for maintaining their patent position they would not engage in joint R & D on products. The relative size of the company within its industry has a direct impact on its philosophy with respect to engaging in joint R & D. Generally, the larger the company in terms of sales dollars, the more sensitive they are to the impact of antitrust policies on cooperative R & D. The dominance of a company in a particular market also served as a factor in setting policy for cooperative R & D. A Company being relatively dominant in one market would not consider cooperative R & D in that field because of concern for antitrust. They would consider cooperative R & D in other fields.

## ANALYSIS

An analysis of the information gained from the questionnaire survey and the interviews, in terms of the three types of joint R & D efforts of interest -- industrial consortia, industry-government programs, and joint programs on an international scale -- shows:

### Industrial Consortia

1. The primary barrier perceived by high technology corporations to the formation of industrial consortia for the development of new technologies to conserve energy, or to exploit energy sources, was antitrust. Four case histories were developed which involved antitrust as a barrier: One phase of Tertiary Oil Recovery, the Fire and Explosion Study, the Smelter Control Research Association (SCRA), and the Inter-Industry Emissions Control (I.I.E.C.) Program. The last three of these programs were put into operation but, because of the antitrust potential, were so organized that difficulties were experienced in pro-

gram direction, continuity of effort, inability to establish long range efforts, and troubles in really coming to grips with the heart of the problem.

The "Business Review Procedure" recommended by the Department of Justice for pre-clearing plans for industrial consortia for R & D is not felt to provide a substitute for publication of pragmatic and detailed guidelines. The Procedure is not widely used by industry for the purpose of clearing joint industrial R & D efforts.

2. Industry engages in cooperative R & D programs through their support of operations such as the Smelter Control Research Association (see Case History V), International Lead Zinc Research Organization, Inc., Pulp and Paper Institute, Compressed Gas Association Inc. (see Case History III), and other similar organizations. Much of this work, however, is generally basic in nature.
3. One case history is reported (IV), Continuous Casting, which illustrates an industrial cooperative R & D effort, which was considered successful and operated with no apparent antitrust problems. Characteristics of the program which may have had an influence on this were the facts that the program was conceived, broad objectives established, and the decision to go, were all made by one company. Following this, other companies were then

invited to join the program. It was considered important that each partner had a right and obligation to license others at reasonable terms.

4. Consortia or cooperative industrial R & D programs are considered by industry for a number of reasons, among which are:
   - a. To share costs and risks.
   - b. To share technologies, have one technology complement another.
   - c. To advance basic science.
   - d. To advance applied technology to point of utilization.
   - e. To enter into a new field.
   - f. To optimize utilization of technical personnel.

   However, there is a strong tendency, if the area of technology is of particular interest to a company and the work can be financed, to go it alone, rather than having to share the results with another company.

## Joint Industry-Government Programs

1. Joint industry-government programs, wherein the government provides a part or all of the financing, were the most common. However, while none was specifically identified in the study, it is believed that a few joint industry-government programs may exist in which both industry and the government actively participate in R & D work, most often at different locations.

2. Government patent policies were the most important barrier perceived by industry to joint industry-government R & D programs. These barriers were judged to be equal in seriousness to the antitrust barrier.
3. In those joint industry-government programs where the government supplies some or all of the money, industry is concerned about the government's patent rights and the right to reassign patents to other corporations. Of equal or perhaps even greater concern is industry's reluctance to jeopardize their proprietary knowledge and technology developed prior to engaging in the joint effort, by the retention by the government of some form of mandatory or compulsory licensing. Such a possibility would be found very objectionable by industry.
4. Three case histories were developed illustrating industry's concern with government patent policies: A second phase of Tertiary Oil Recovery (Case History I), Pumps (Case History II), and Catalysts and Related Technology (Case History VII). All of these illustrate concern over possible loss of proprietary technology. Case History VII, Catalysts and Related Technology, presented at the "Seminar on Institutional and Legal Constraints to Cooperative Energy R & D" noted later, deals with this barrier in some detail.

5. In the industry-government joint R & D program category there was another barrier, that of the problems in developing an efficient, cooperative effort between industry and government. Some of these problems are identified on page 150 under "other". These barriers are essentially "people problems". Case History VIII, "Industry-Government Cooperation on the H-Coal Project", further elaborates on these problems, particularly highlighting governmental delays in arriving at decisions, lack of commitment to a long range goal, etc.

## Joint Programs on an International Scale

1. While the study revealed relatively little international joint R & D activity, it also indicated that there was no philosophical objection to such activity. In fact, indications are that joint international exchanges are on the increase.
2. One of the case histories developed (VI), "Inter-Industry Emissions Control (I.I.E.C.) Program", had an international flavor, in that, at one time or another and to varying degrees, several Japanese, a German, and an Italian motor company collaborated in the program.
3. Information was developed which indicated that if a foreign company or companies could contribute to a joint program there was no reservation to making them an active party to the joint R & D venture. The COGAS Development Company

illustrates this point. COGAS is a joint venture of six companies to develop the COGAS Process to produce clean-burning fuels from coal. Two pilot plants have been constructed by the COGAS Development Company: One in this country, based on a process designed by the Company, and another in England, based on a process designed by the British Coal Utilisation Research Association.

## CASE HISTORIES

As shown above, case histories illustrating constraints to cooperative R & D were sought during the interviews. It was found that while several companies had indicated, when responding to the questionnaire, having case histories documenting the effect of constraints on their consideration to engage in cooperative R & D, the number of instances that could be adequately documented and publicized were somewhat less than expected. Nevertheless, documented case histories were obtained and four of these were presented at a "Seminar On Institutional And Legal Constraints To Cooperative Energy R & D" held in Washington, D. C., December 16, 1974.

One would have also expected a larger number of case histories being available, considering that 89 companies or 85 percent of those responding to the questionnaire stated that they considered constraints a real problem in attempting to conduct cooperative R & D. The fact that case histories were not more common was explained rather simply by several interviewees by stating -- "we have learned to live within the rules of antitrust, and therefore, the question as to whether or not to engage in cooperative R & D or case history never develops". This philosophy had the same impact and result as a policy of not engaging in cooperative R & D of the consortia type.

Another comment, typical of several responses, was to the effect that R & D programs are carefully planned in advance and if antitrust or patent problems were anticipated the program was never activated.

Companies expressed real concern, when considering cooperative R & D, over three categories of constraints:

1. Antitrust, when considering programs involving joint company endeavors.

2. Patent rights and protection of proprietary technology, when concerned with joint industry-government programs.

3. A third category, "other", largely concerned with government programs, economics, and "people" problems.

The constraints to cooperative R & D classified as "other" can best be illustrated by a number of comments pertaining to this condition. No significance should be attached to the order in which the comments are offered.

1. The great risk in energy R & D today is the question of the future price of oil. The price today is politically

determined. If it were a free market, industry could evaluate the market and assume risks as they have been accustomed to doing; but they cannot do this when the future price is so subject to political pressures.

2. The extended paper work and time involved in negotiating and getting approvals for government contracts acts as a constraint to cooperative R & D. Government contracts are frequently not sufficiently flexible to allow optimum performance.

3. There is a considerable variation in patent policies between government agencies. The energy R & D program would benefit from more of a unified approach. There should be a commonality of approaches among the agencies. It was suggested that the energy R & D program would benefit by being structured in the same manner as NASA or D.o.D.

4. People were stated to be a real constraint to cooperative R & D. At times difficulties are experienced in having company people work in complete harmony and with a common purpose with government agency people. References were made to an adversary atmosphere that occasionally appears to exist between government and industry, that apparently does not exist in most foreign countries. There was some concern that there is a real scarcity of well qualified people to do the necessary R & D. In the same people problem area, the ultra conservative attitude of some company law department personnel, particularly toward situations involving possible antitrust, was mentioned. The constant change of personnel in government results in changes of

philosophies, policies, etc., -- what is OK today, may not be tomorrow.

5. Some type of economic incentive to industry would make joint government-industry work more attractive. Subsidization of price when a large demonstration plant is built was a possibility that was mentioned.

6. Concern was expressed over the possibility of changing ground rules with respect to antitrust. The question was phrased -- "is cooperation essentially anti-competitive"?

Based on the discussions during the interviews, an attempt was made to weight the company concern with each of the defined constraints; patent policies, antitrust, and "other". Concern for patents and antitrust was essentially equal in that 18 to 20 of the companies were judged to consider these constraints of most concern. It was indicated that 12 of the companies would consider the "other" category of constraint to be most important. In this rating the numbers do not add up to the total of 35 companies interviewed since several companies were judged to give equal weight to two or three constraints. While the rating is somewhat subjective, it does indicate the relative criticality of each type of constraint. Of particular interest is the level of importance attached to the "other" types of constraints.

Eight case histories are summarized later in this report, illustrating all of the various constraints revealed through the study; concern for antitrust, patent policies, and government delays or practices. One of the eight reported illustrates a successful joint industrial R & D effort, so organized and managed as to be free of antitrust concern. The eight are identified as follows:

1. Tertiary Oil Recovery -- Patent policy and antitrust as constraints.
II. Pumps -- Patent policy as a constraint.
III. Fire and Explosion Study -- Antitrust as a constraint.
IV. Continuous Casting -- A successful cooperative industrial R & D effort.
V. The Smelter Control Research Association (SCRA) -- Antitrust as a constraint.
VI. Inter-Industry Emissions Control (I.I.E.C.) Program -- Antitrust as a constraint.
VII. Catalysts and Related Technology -- Patent policy as a constraint.
VIII. Industry-Government Cooperation On the H-Coal Project -- Government delays as a constraint.

The last four of the above identified case histories, as noted earlier, were presented in greater detail at a "Seminar On Institutional And Legal Constraints To Cooperative Energy R & D", co-sponsored by the U.S. Department of Commerce and the Industrial Research Institute, and held in Washington, D.C. on December 16, 1974. The detailed case histories are printed in the Proceedings of that meeting along with other information of interest to the subject of cooperative R & D. They are also appended to the official copy of this contract report.

## CONCLUSIONS

1. United States high-technology corporations are fully aware and perceptive of barriers to their participation in:
    a. Industrial consortia for the development of new technologies.
    b. Joint industry-government R & D programs for the development of new technologies.
    c. Joint programs on an international scale for the development of new technologies.

2. Barriers to the categories of joint R & D programs of interest are identified as:
    a. Antitrust regulations and a concern for antitrust action when involved with consortia.
    b. Patent policies, when concerned with joint industry-government R & D.
    c. "People" problems, wherein the R & D programs are joint industry-government; these are identified as governmental delays in arriving at decisions, adversary situations (government versus industry),

and government agency problems in making long term commitments basically necessary to R & D.

d. No specific, real problems were identified pertaining to joint R & D programs on an international scale, assuming that all partners can make a contribution to the program, and that the problems of communication and differences in legal status of the partners can be satisfactorily resolved.

3. Case histories are available, some involving energy technologies, others in different fields, which illustrate U.S. industry's perception of legal and institutional constraints to joint R & D programs.

4. Eight case histories were developed and are presented. Seven of these illustrate U.S. industry's concern for the identified barriers to joint R & D programs. One case illustrates the organization of a successful industrial joint R & D program.

## ACKNOWLEDGMENTS

Sincere thanks are expressed to all of the Industrial Research Institute representatives who participated in the study either by responding to the questionnaire or by being interviewed. Without their cooperation the study would not have been possible.

# CASE HISTORIES

(summaries)

# CASE HISTORY

## -I-

## TERTIARY OIL RECOVERY

Marathon Oil Company has probably conducted more research and development concerned with tertiary oil recovery technology than many other oil companies. They have invested some $30 million in this work over the last ten years which represents a considerable investment. A basic technology position of considerable value has been developed.

The Bureau of Mines requested proposals from industry for research and development in tertiary oil recovery on a cost sharing basis. Marathon Oil Company was interested in the program but feared that if they participated they would jeopardize their basic position and previous investment in surfactant type flooding. Other oil companies experienced in tertiary oil recovery research did not participate or submit proposals for the same reason.

Marathon Oil Company is also concerned about the potential antitrust aspects of tertiary oil recovery. Marathon, along with other companies, has used the Illinois oil fields for tertiary oil recovery experiments because more oil was left in these fields after secondary recovery. The oil companies, having interests in the Illinois fields, do not feel they can pool information, which would be the most economical and expeditious manner of developing the necessary technology, because of the threat of restraint of trade.

## CASE HISTORY

## -II-

## PUMPS

The Byron Jackson Pump Division of the Borg-Warner Corporation has, over a period of several years, developed considerable background technology and a patent position, all financed with company money, in the fabrication and manufacture of many types of pumps. Many of these are used in fossil fuel power plants and in other commercial pumping applications. This technology has lead to a basic position as the leading producer of mechanically sealed primary coolant pumps for nuclear power plants. Since the technologies are all inter-related, it is the Corporation's preference to market such pumps and their included technology as items of commerce, rather than get involved in the complexities and questionable benefits of CPFF contracts.

Because of the problems outlined above, and the questionable patent provisions of the Atomic Energy Act, it has been a matter of policy to consistently decline government R. & D. work where these pumps might be involved.

This policy has recently been modified in the application of a liquid sodium pump, tailored specifically for the fast breeder reactor. Here, it is believed that the technology is sufficiently different from the extensive basic know-how, to allow government R. & D. contracts for such a pump to be considered.

# CASE HISTORY

## -III-

## FIRE AND EXPLOSION STUDY

Air Products and Chemicals, Inc., conceived a research program which had as its ultimate objective, minimization of fires and explosions occurring in the use of oxygen in compressors, turbines, and similar high speed moving machinery. The compatibility of materials, metals, surface finishes, and lubricants were to be studied in relation to their effect on the potential for fires and explosions.

Air Products asked the Linde Division of Union Carbide Corporation to join forces in the program. Linde considered the program to be of value; however, they were concerned about the antitrust implications that could arise from two of the larger oxygen producers collaborating on a program having a significant impact on manufacturers of oxygen compressors. In addition, they felt the program should be of interest to other oxygen producers as well as machinery manufacturers. They, therefore, proposed that the work be done through The Compressed Gas Association, which had long had an interest in safety matters. Air Products introduced the program to the Association but it was on a much more general basis and did not seem to take hold or develop interest.

Essentially, because of antitrust concerns an apparently very worthwhile cooperative R. & D. program was sacrificed.

## CASE HISTORY

## -IV-

## CONTINUOUS CASTING[3]

The case history reported here is one in which four major steel companies participated in a joint research and development project having to do with the continuous or strand casting of steel slabs and blooms for high quality sheet and tin mill products. The case is offered as an example of a joint R. & D. program, organized in such a manner as to avoid conflict with antitrust requirements.

Bethlehem Steel Corporation made an independent decision to install and operate a casting pilot plant under the responsibility of its research department. The broad objectives and magnitude of the program were established, following which three other major steel companies were invited and joined the program, sharing in its cost, operating direction through a policy committee, and technical results. An important point in the agreement provided for the right and responsibility to license the technology to third parties at reasonable terms. This part of the agreement pertained to both "pooled information", that developed jointly, and "existing information", that developed within the respective laboratories of the participating companies as part of the program.

The program was considered to be quite successful in that the objectives were achieved, a practice was developed, all within a genuine spirit of cooperation.

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[3] "Joint Development of the Strand Casting Process for Quality Sheet and Tin Mill Products", T.B. Winkler and J. W. Halley. Prepared for presentation at Chicago Regional Technical Meeting of American Iron and Steel Institute. October 14, 1971.

## CASE HISTORY

## -V-

## THE SMELTER CONTROL RESEARCH ASSOCIATION *

The Smelter Control Research Association (SCRA) was incorporated in 1971 as a non-profit research corporation to engage in research and development to determine the feasibility of removing sulfur from the lean gas streams produced by reverbatory furnaces used in the smelting of copper ores. The funding participants of SCRA included all of the U. S. copper smelter operators. Subsequently, the R. & D. objectives have been somewhat broadened to study technical and economic feasibility of various scrubbing processes for possible application to smelters. The objectives have always been closely coordinated with pollution abatement and the requirements of the Clean Air Amendments of 1970. Basically, the effect of the time constraints imposed by air quality standards was to limit R. & D. to emission reduction from existing smelters and to defer major process changes to the future.

It is believed obvious that an association such as SCRA is not established to restrain trade or violate the antitrust laws. However, Department of Justice policy, as expressed by individuals of the department does not provide useful or adequate guide-lines for those contemplating joint research efforts and activities such as SCRA. Lack of satisfactory guide-lines is additionally confused and problems compounded when considered in association with pollution control regulations and requirements.

The Department of Justice recommends that industry pre-clear their plans for joint R. & D. efforts under the Department's Business Review Procedure. This procedure does not provide satisfactory criteria determining what might be an acceptable joint effort and is generally considered to be an inadequate substitute for the publication of pragmatic and rather detailed guidelines which are permissive rather than restrictive.

* (Summary of full case history
presented at 16 December "Seminar")

## CASE HISTORY

## -VI-

## INTER-INDUSTRY EMISSIONS CONTROL (IIEC) PROGRAM *

A truly cooperative "systems approach" R. & D. program was initiated with the signing of an agreement between Mobil Oil Corporation and Ford Motor Company on April 21, 1967. The three-year, $7,000,000 study was designed to accelerate development of a virtually emission-free, gasoline powered vehicle. It became identified as the Inter-Industry Emissions Control Program (IIEC).

Nine additional companies, domestic oil companies and foreign motor companies, subsequently joined the program.

One part of the program, concerned with engine hardware and concept vehicle development, was carried out by the automotive participants. Another part, primarily concerned with the chemistry of fuel composition, additives, lubricants and catalysts, was carried out principally by the petroleum companies.

Before the end of the first 3-year program, it was evident that significant progress had been made and it was agreed that the study should be continued. However, a consent decree entered October 16, 1969 which prevented Ford from undertaking new cooperative research in the control of automotive emissions with any other automobile manufacturer having a 2% share of the world vehicle market significantly hampered future program activity. The IIEC program is considered to be a successful cooperative R. & D. effort. The results have been publised and have provided the basic technology for many of the emission control systems in use today. However, the program was adversely affected by legal constraints, year by year approval, uncertainties and delays.

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* (Summary of full case history presented at 16 December "Seminar")

## CASE HISTORY

## -VII-

## CATALYSTS AND RELATED TECHNOLOGY *

In mid-1974, following extensive study and consideration, a recommendation was made to American Cyanamid Company's management by the Director of the Chemical Research Division, that the Company not participate in Project Independence due to restrictive patent policies being considered in Congress at that time.

Cyanamid has a history of engaging in government sponsored R. & D. This work, which has been at a lower level in the recent past, has involved fuel cells, catalytic air purifiers, zinc/air batteries and other energy conversion technologies. American Cyanamid has, over a period of 20 years, developed a valuable and extensive technological background concerned with catalysts and catalyst supports. This technology is supported by a group of trained and experienced scientists and is backed by many patents. Catalyst know-how involves capability of developing specific purpose catalysts, and evaluation of catalysts for activity, life, and mechanical properties.

Cyanamid's catalyst know-how should be of value to many aspects of the nation's energy R. & D. programs. Methanation catalysts are used in the conversion of coal to high B.T.U. synthetic natural gas; desulfurization of high sulphur coal is accomplished catalytically; denitrification catalysts are used in the refining of oil recovered from shale; coal liquefaction involves specific catalytic treatment. These catalyst applications are only a few of those basic to the energy program. [no ¶]

In addition, Cyanamid has developed other technologies applicable to the development of new energy sources.

Thus, the point that American Cyanamid is in a position to make contributions to the nations energy R. & D. programs is well established.

Whether or not Cyanamid can participate in Project Independence by accepting government sponsored contracts depends almost entirely on government patent policies and whether these policies afford them protection for their basic technology position.

* (Summary of full case history
presented at 16 December "Seminar")

## CASE HISTORY

## -VIII-

## INDUSTRY-GOVERNMENT COOPERATION ON THE H-COAL PROJECT *

The "H-Coal Process" under development by Hydrocarbon Research, Inc., since 1962 is designed to convert coal into either a synthetic crude oil or a heavy liquid fuel. The process is based on catalytic hydrogenation using an ebullated-bed reactor, which provides continuous movement and close contact between catalyst and reactants.

Sponsorship of the H.R.I. development work has been varied. Initial work was financed by H.R.I. In 1965 the Office of Coal Research provided 100% sponsorship for the next 2½ years, at which time their support was terminated by budget problems and H.R.I. again assumed sole sponsorship. In 1968, private industry became interested and from 1968 through 1973 a number of petroleum companies, including Arco, Sun, Ashland, Exxon, and Standard Oil (Indiana) at one time or another, all provided support. During all this period of time it should be noted that progress of the development work was constructive and favorable.

In 1973, H.R.I. approached OCR to determine their possible interest in sponsoring a 600-ton per day demonstration pilot plant of the H-Coal process. After some discussion, H.R.I. was requested to prepare a proposal. From that time to very recently, progress has been hampered by a number of problems as follows:

1. Changing and unsatisfactory patent provisions.
2. Inadequate consultation with private sponsors.
3. Changing and reversals of rules for contract.
4. Inflexible requirements of work program.
5. Problems in determining program content, including selection of site and operator.

The problems brought forth in this study are essentially "people" problems. They are amenable to greater and continued experience in making industry-government cooperative R. & D. really work.

* (Summary of full case history
presented at 16 December "Seminar")

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